

BROOKLYN BOTANIC GARDEN

PLANTS
&
GARDENS



Spring, 1948

Polar Wild Flowers

—

Layout of the Small Place

—

Irises

Culture, Uses,
Classification, Breeding

—

The Breeding of Extra-hardy
Plants for Cold Climates



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Euonymus Fortunei var. *vegetus*

NEW SERIES

Spring, 1948

VOL. 4—No. 1

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Magnolias and Daffodils. Early spring at the Botanic Garden

Except where otherwise credited, photographs by Louis Buhle

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Spring 1948

SPRING GREETINGS TO READERS OF PLANTS & GARDENS:

What a master plan it is that once each year gives the whole world a season of lush new growth! As this is written, winter snows are melting, the weather is softening, and the age-old pattern of the seasons is about to be repeated.

ABOUT THIS ISSUE — In the first half-dozen articles of "general" interest, Editor Wister's authors have answered a host of questions. Read the articles by:

Rutherford Platt, whose "Polar Wild Flowers" answers questions like these: How close to the North Pole do wild flowers grow? How large are they, and how freely do they bloom? How can plants grow in a rainless, frigid land?

We are very glad that this brief story of Mr. Platt's 1947 arctic expedition can appear in PLANTS & GARDENS, for it was here at the Garden that he took his first courses in plant life, and laid the groundwork for becoming a noted amateur botanist.

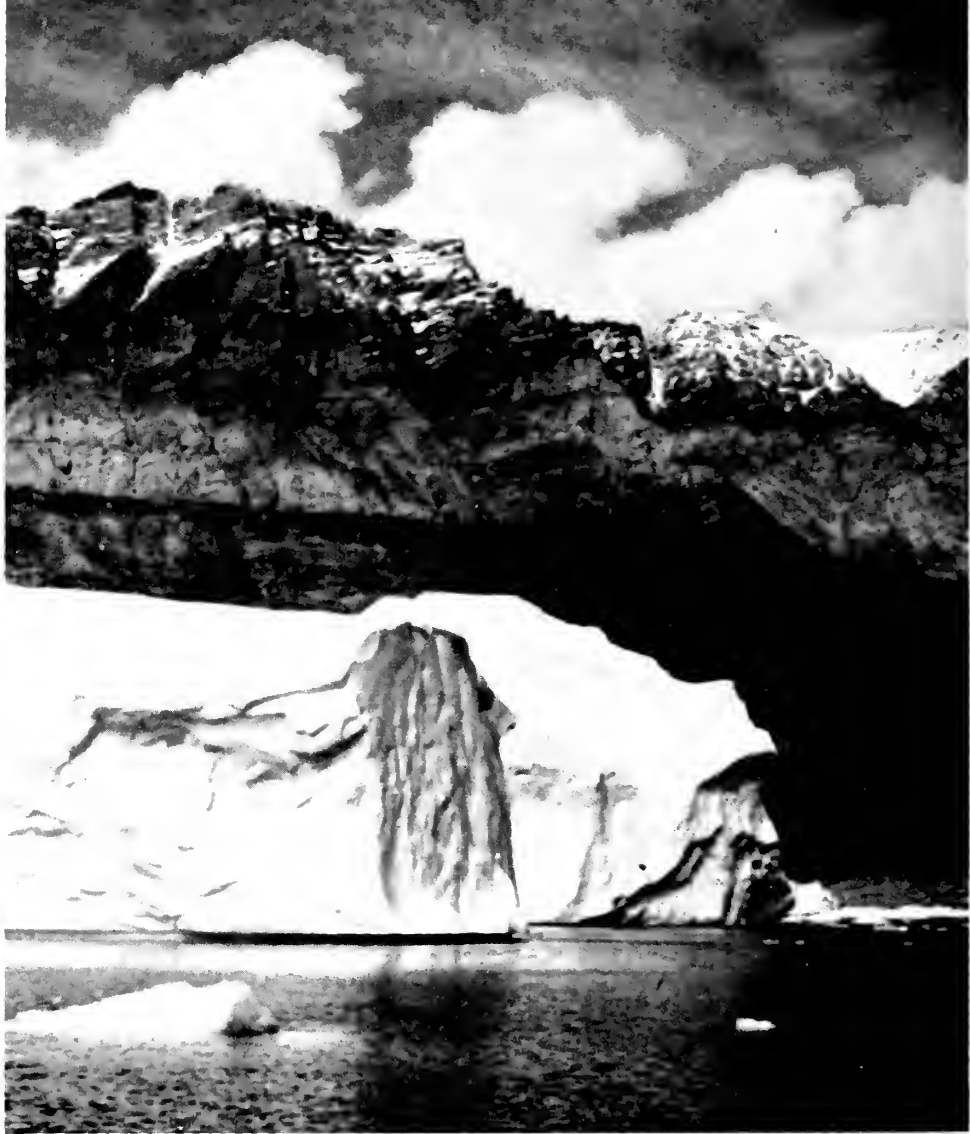
Niels E. Hansen — and discover what he means by ... "the winter protection of any plant is horticulture on crutches" ... and ... "dethorning of the world's roses is quite possible."

Alice Horsfall, F. L. Skinner, Marion T. Rowley, and William H. Frederick, Jr. — and get the urge to know more about the right plants to use in difficult climates and special situations.

The articles on Iris are the feature of this number. The Editor — himself a well-known Iris authority — has selected ten other competent authors to write on every phase of Iris culture. There is no longer any need for PLANTS & GARDENS readers to guess about Iris — the kinds to grow, or how and where to grow them. It is our hope that this Spring issue will be particularly helpful.

Sincerely yours,

George S. Arny, Jr.
Director



Author photos

Iceberg and arid mountain of the Arctic, north of Melville Bay

POLAR WILD FLOWERS

*The amazing paradox of fresh
flowers in a dry, cold region*

Rutherford Platt

TO all appearances, even from a few hundred feet offshore, the rock and ice empire of the polar regions is lifeless.

Ice is sterile. There is very slight precipitation in summer; there are no springs, no swamps or bogs as we know them, and few level places. You climb on steep rocks and up the huge boulder talus slopes. The surfaces are dry and terribly exposed to arid cold winds. What do you find in the form of life?



An arctic Chickweed (*Cerastium alpinum*), at Etah, on the Greenland coast

You can fill the plant-collecting box with brilliant, healthy wild flowers in a few minutes. Among these are Saxifrage, Fireweed, Buttercup, Poppy, "Arctic-rose," and Chickweed. In this world of immense scale, in which an iceberg half a mile across is a mere speck and an 80-foot schooner with its tall masts vanishes—the plant kingdom, seemingly ever resourceful, has become diminutive according to our scale.

"Roses" and Buttercups

The Fireweed (*Epilobium*), tall and graceful in our world, achieves 2 or 3 inches there. The "Arctic-rose" (*Dryas octopetala*) and the Buttercup are an inch or so. Chickweed and Mustard may be full-grown when less than an inch high. In fact, the entire flora is mostly below ankle height, but it includes some of the brightest, healthiest, and most freely-blooming flowers in the world.

These grow, not as a continuous ground cover, but scattered in cracks of the granite or snuggling under the curve of boulders. Their leaves are in compact rosettes, flat on the ground. They usually form pin-cushion clumps or mats. Each plant has one central taproot that grows into a crack or penetrates the stone between boulders with amazing power. A mat of Saxifrage or Fireweed may be a foot across and have a couple of dozen flowers—but it has only one root. This thick root is a mighty anchor; but where does it find moisture, in dry rocks where there is no soil, in an almost rainless land? The answer is unique. Any slight rain, perhaps an inch in the whole summer, would promptly drain off among the boulders. The polar wild flowers are not dependent on rain. Moreover, they get practically no moisture from local snowfall, which is surprisingly light in the naked rock areas along the coast of northern Greenland. The little snow that falls is borne away as the driest dust in the tremendous winds.

Rainless Plants

The water supply for the coastal polar plants comes from the mighty snows that fall in the *interior* of Greenland. They build the Ice Cap that is beyond imagination in its massive expanse. The Greenland Ice Cap is a relic of the Big Ice that formerly covered the northern part of the United States. It domes up to eight or ten thousand feet, and its great weight pushes out the flanks with almost horizontal pressure. These flanks reach out to the rock mountains on the coast, where they are channeled through the valleys in the form of curving white fingers. The Ice Cap and its glaciers are one. The bulk of the ice remains bitterly cold, brittle, and unaltered. This ice slowly moves to the tip of a glacial finger, where it is broken off by the tides and floats away in the spectacular berg fleet that moves across the northern seas. But

during a few weeks of the year, the sun, which shines twenty-four hours a day, melts the surface of the glaciers that lie above and between the coastal mountains.

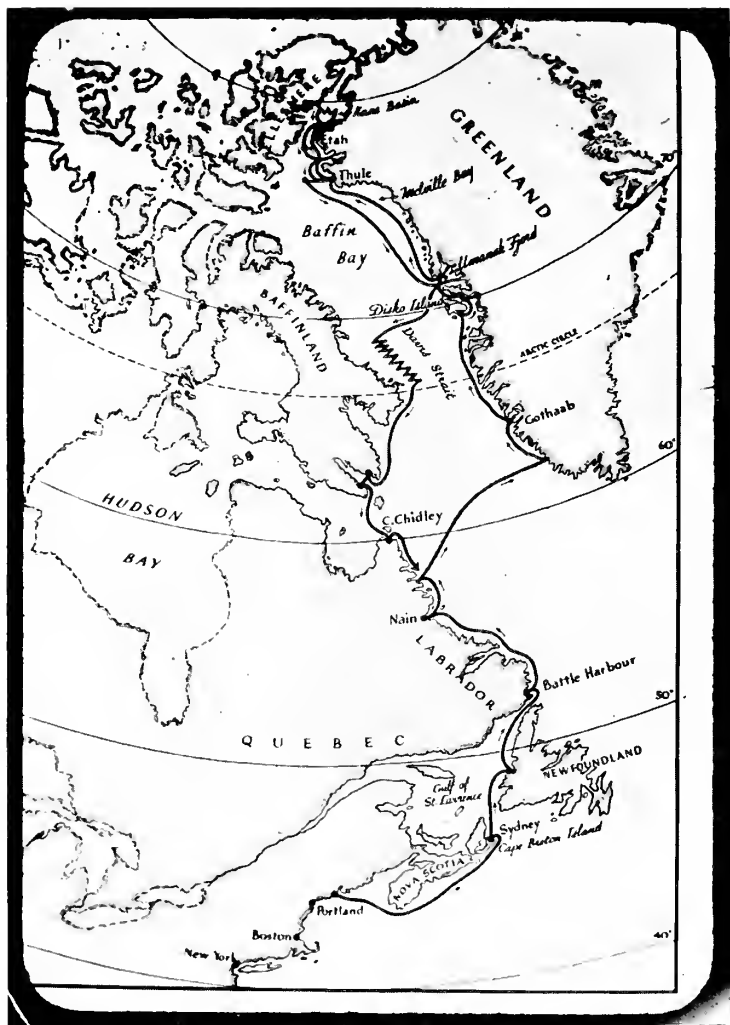
Surface melting releases countless gallons of pure water that was locked in the ice in the interior of Greenland for thousands of years. This flows down through the crevices of the granite, and spreads across the slopes of the rock mountains. It freezes, stopping the crevices of the rocks with ice, and forming an ice sheet beneath the surface boulders of the talus slopes. This prevents the next season's release of water from draining away, and causes free water to fan out over the mountain sides. It is held just below the boulders, or it forms puddles in the cracks. There it dissolves the minerals of the granite gneiss or the basalt. This solution of chemicals is drawn upon by the powerful root of the clumped plant that sits up in the sunlight among the loose boulders or on the crack of cliff rock. It is a demonstration on a huge scale of natural hydroponics (growing plants without soil with their roots in a nutritive solution).

"Arctic-rose" (*Dryas octopetala*)—flower about $\frac{3}{4}$ inch wide





Masses and Wild
owers grow close
the face of the
acier, near Etah,
the Greenland
ast.



The trip on which this article is based was a cooperative enterprise, in which a group of men with varied interests—ornithology, geology, botany, geography, and anthropology—became members of the crew of the arctic schooner *Boxdoin*, skippered by Commander Donald B. MacMillan, the famous arctic explorer.

Davis Strait, between North America and Greenland, is filled with pack ice that generally hugs the Ellesmereland and Baffinland coasts. But along the west shore of Greenland there is enough open water during the summer season so that a ship built

to receive the blows of ice and rock may work its way northward and penetrate into Kane Basin in the polar region. Thus Mr. Platt's party was able to go within about 11° of the North Pole. Because the *Boxdoin* is an auxiliary schooner, they were able to conserve oil by using the sails whenever wind and open water permitted. A hundred-horsepower Diesel engine made it possible to continue on the course amid the ice. They traveled about eight thousand miles round trip, encountering uncharted rocks and ice, without having the schooner become seriously crippled.—Ed.

BREEDING OF EXTRA-HARDY PLANTS FOR COLD CLIMATES

A report of progress in developing them, and prospects for the future

Niels E. Hansen

EXPLORATION

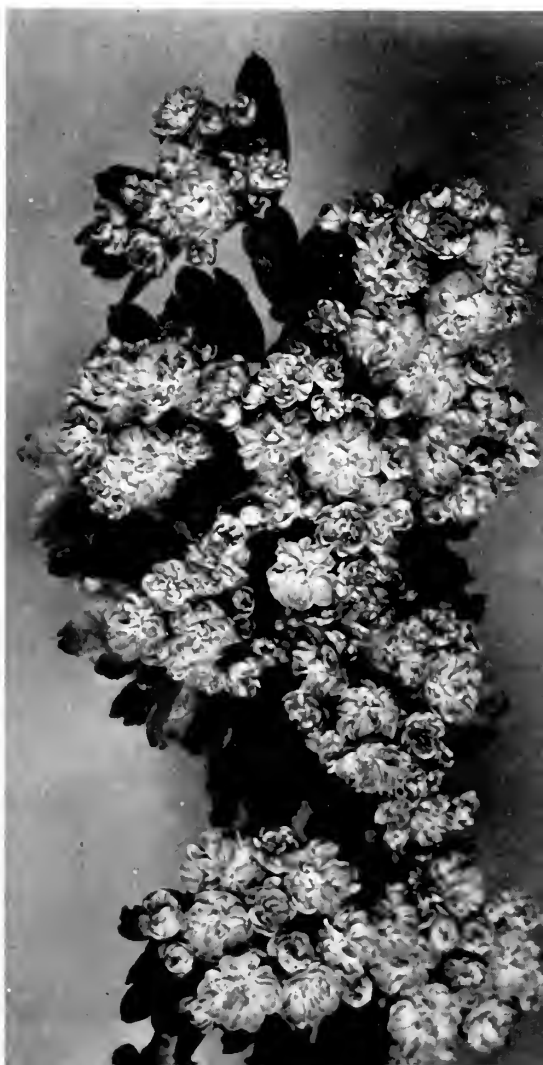
NO one country has all the food and ornamental plants desirable for cultivation. The policy of sending agricultural explorers to foreign lands, inaugurated by the Secretary of Agriculture, James Wilson, has been adopted and enlarged by the Soviet Government in sending out over 100 expeditions to many foreign countries and into the unexplored interior of the Soviet Union, especially Turkestan and Siberia and adjacent regions.

SELECTION AND HYBRIDIZATION

All this pioneer work of the explorer is only preliminary to the work of improvement by selection and hybridization. In the prairie Northwest there is great annual loss due to the winterkilling of tender varieties of ornamentals from milder climates. Hardier varieties will save this loss. My experiments at Brookings, South Dakota, since 1895 have been mainly on fruits, with ornamentals as a side line. The winter protection of any plant is horticulture on crutches. We should breed for perfect hardiness. In the pioneer days of the prairie West fruits were needed first. It is time to give more attention to the ornamentals. Some of the work can be done by amateurs. A good example of amateur breeding is the taking out of the black heart in poppies by Rev. W. Wilks of England, giving us the famous Shirley poppies; another is the de-

velopment of the first very early sweet peas by a farmer's wife in Pennsylvania. Every flower lover will find that it adds to the interest of gardening to experiment with some favorite flower in his home garden. Our wild flowers offer a vast field for experimentation.

A flowering branch of Paul's Double Scarlet Hawthorn (*Crataegus Oxyacantha* var. *Paulii*)



Some of the main results of my work with ornamentals are as follows: *Prunus cistena* is a dwarf purple-leaved bush cherry which I introduced in 1909. The female parent is the western sand cherry, *Prunus Besseyi*; the purple-red foliage is from the male parent, *Prunus cerasifera atropurpurea*, formerly called *Prunus Pissardii*. *Prunus cistena* is a beautiful shrub following the sand cherry in stature of plant and glossiness of leaf; but the foliage has the rich purple-red color which gives its Persian sire such wide popularity. *Prunus cistena*, or purple-leaf sand cherry, is now widely popular across the continent as a dwarf hedge plant or as single specimens on the lawn.

Hidatsa, a hardy double-flowered hawthorn introduced in 1941, was produced by crossing Paul's Double Scarlet hawthorn of England with a native wild hawthorn of Pilot Mound, Manitoba, as the male parent. The abundant double flowers are light shell-pink. The glossy attractive foliage with each sprig provides "a beautiful ready-made corsage," as the student girls said when they first saw them. There were at least 7 double-flowered seedlings from this cross, but war conditions have retarded their propagation.

Hybrids have been made between early peonies, early-blooming primitive peony species and standard varieties. The aim is a month's earlier bloom. The result so far is a lot of seedlings blooming 2 weeks earlier and so the work is one-half completed. These plants have been divided and replanted for further testing.

A New Hardy Perennial

N. E. Hansen Monarda is a beautiful red-flowered perennial in bloom the last half of July and early in August. It is a hybrid, originated in 1932 by pollinating the local form of horse-mint or wild bergamot with Oswego-tea or bee-balm. The horse-mint (*Monarda fistulosa*) is found on dry soil and in thickets from Maine and Ontario to Minnesota and the Dakotas and south to Louisiana. Oswego-tea or bee-balm (*Monarda didyma*) is

native from eastern Canada to Michigan, south to Georgia, and is one of the most brilliant of American native flowers, being surpassed in the intensity of its red color only by the cardinal-flower. Planted at this station, it winterkilled twice. The N. E. Hansen Monarda combines the great hardiness and sturdy erect habit of *M. fistulosa* with the brilliant red flowers of *M. didyma*.

Other Hardy Perennials

Other work has been planned in improving the wild flowers. Many plants have been collected in field explorations, but the experiments are postponed until money and land are available. Many of our native species show great promise.

Red Jelly Crabs with White Flesh

Dolga crab is now widely popular even east to our Atlantic coast. The Dolga was the best of some 500 1-year-old seedlings of Siberian crab apple which I brought from Russia in the 1897-98 tour as agricultural explorer. The Alexis crab, introduced in 1912, was grown from seed obtained from the old Imperial Botanic Gardens at St. Petersburg (now Leningrad). Both Dolga and Alexis are of the *Malus baccata cerasifera* type. They are almost identical in fruit. The Alexis makes a larger tree in full maturity. Both of the original trees are still growing in the gardens of the South Dakota Agricultural Experiment Station. The red color of the sauce and jelly comes from the deep red skin; the flesh is white.

Apples with Red Skin and Flesh

It is worth while to change the color of applesauce as well as apple jelly from dull yellow to bright red, as it adds beauty to utility and increases the commercial value. In the Redflesh crab, introduced in 1928, it was my good fortune to combine red flesh with red skin. This crab is a heavy annual bearer, the fruit

is 1½ x 1½ inches, the skin a brilliant solid polished dark red all over. The pedigree is Redvein crab x Elk River Minnesota wild crab (*Malus ioensis*).

Apples with Red Flowers, Skin, and Flesh

In the fall of 1897 I went to Alma Ata, northeast Turkestan, in the edge of China. At that time it was an interesting place, with 1-story buildings because it was subject to frequent earthquakes. I met Mr. Niedzwetzky, an official in government service, who had just found a re-

markable type of apple with red flowers, and fruit with red skin and flesh, in the Tian Shan or Heavenly Mountains that separate Russian Turkestan and western China. This apple is named *Malus pumila Niedzwetzkyana*. In America the accepted common name now is the Redvein crab. I have worked with this apple ever since and have a lot of seedlings.

Hopa, which I introduced in 1920, is a red-flower crab apple, now popular from coast to coast as a beautiful lawn tree. The female parent was the Redvein crab; the male parent, *Malus baccata*.

Bee-balm or Oswego-tea (*Monarda didyma*)

McFarland photo





From painting by Maud H. Purdy

Malus pumila Niedzwetzkyana has contributed the red-flesh character to the Crab Apple Ata

The Red Tip crab was introduced in 1919. It is an interesting lawn tree with red-tipped leaves, the color derived from the Redvein, the male parent. The female parent is *Malus ioensis*, a native wild crab from Elk River, Minnesota.

The Almata apple, introduced in 1942, is my largest of the series so far. It has fruited annually since 1941, when it began. In 1944 the size of the fruit was $2\frac{7}{8}$ inches across. Further south it will no doubt be fully 3 inches. The fruit is a solid brilliant red; the flesh bright red throughout, tender, pleasantly subacid, of excellent eating quality. Almata is also an ornamental lawn tree, with its red flowers.

In 1945 I introduced the Ata, a red-flesh crab, which is now widely grown and found to be very productive. It is somewhat larger than my Redflesh and a good companion to it. Its pedigree is Sasha apple \times Redflesh crab apple (pollen). The red flesh is from *Malus pumila Niedzwetzkyana*. The fruit is a solid polished red all over, a little over 2 inches; the flesh red throughout, sprightly, subacid, of good quality. The fruit should be left on the tree as long as possible to get the full color. The name is from Alma Ata, capital of Kazakstan.

Other Work with the Redvein Crab

In France and England the Redvein crab has received attention, to develop red-flower crabs. In 1934 at Michurinsk, Soviet Union, I saw successful work with the Redvein crab under way by Ivan Michurin, at the 60-year jubilee in honor of his work. Some good red-flesh apples have been the result. In Canada this variety has been the basis of work at the Ottawa, and Morden, Manitoba stations, on "Rosy bloom crabs." At the Geneva, New York Station the Redfield and Redvein are listed as red-flesh apples bred from the Redvein crab. My son, Carl A. Hansen of Brookings, South Dakota, originated Red Silver crab, darker red than Hopa, with silvery maroon foliage. The field is still open. Who will first produce a 4-inch apple with red flowers, skin, and flesh?

Breeding Hardy Double Roses

This work, which I began at this station in 1895, is described in South Dakota Bulletin 240, May 1927. In the early years the main species used was a tall form of *Rosa rugosa*, which I brought from Russia, and which was originally taken from East Siberia by Russian botanists to the Botanic Gardens at St. Petersburg (now Leningrad). The flowers are large, single, deep, brilliant crimson. In all the many hybrids made, the thorny stems were dominant. This confirmed the extensive experiments in Europe and America which showed that the thorns of *Rosa rugosa* are dominant. This led me to take up a new line: to originate roses without thorns; not only the thorns on the stems, but also the bristles on the rachis or midrib of the leaf.

The thornless roses come from two species: *Rosa blanda*, native from eastern Canada and New York west to the Dakotas and Manitoba; and *Rosa pendulina (alpina)* of the Alps of Europe. The main work has been with *Rosa blanda*, acquired in thousands of miles

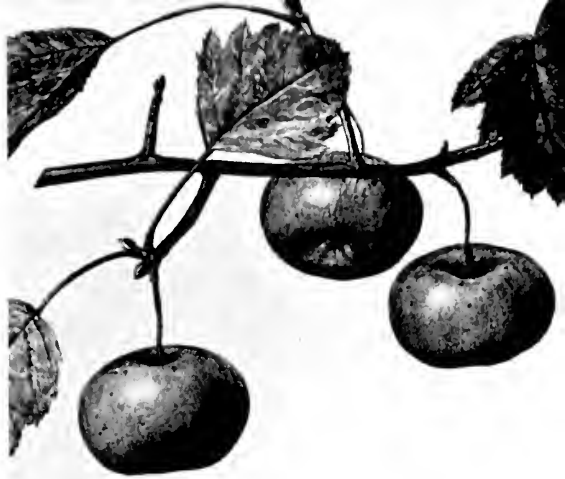
of field collecting in the Dakotas, north-western Minnesota, and southern Manitoba. Roses hybridize so readily that it is very difficult to find a 100 per cent thornless bush. The first *Rosa blanda* hybrid was Tetonkaha, introduced in 1912, but it was not thornless. Many more *Rosa blanda* hybrids have appeared since then. The 100 per cent thornless ones are Pax Amanda, Pax Apollo, and Pax Lola, all introduced in 1938. The best double pink *R. blanda* hybrid so far is Lillian Gibson (introduced in 1938), but it is not quite thornless. The best red so far is Zitkala, introduced in 1942; it is very nearly thornless, and is a typical *Rosa blanda* plant of strong upright habit, with red bark. The flowers are a brilliant velvety red, nearly 3 inches across, with 26 petals. After many years this is the first break, away from the lavender-pink of the wild rose; in other words, the first success in getting the blue out of the red, in getting what the poet Robert Burns called "the red, red rose." "Zitkala" is Teton Sioux Indian for "bird."

Thornless rose stocks are needed also. It takes 25 million rose stocks annually for budding and grafting, to supply the American market. The propagators suffer danger from the commercial thorny stocks now in use. The experiments at this station point to special selections of our native *Rosa blanda* as the most promising for this purpose.

The Hansen Formula for Thornless Roses

The best formula for thornless roses, as I see it, is *Rosa blanda* \times *R. alpina*, because there is thornlessness on both sides.

This is the principle observed in 50 years of work. I hope it will be tried by many rose breeders, so that in time rose thorns will be only a memory. By applying Mendel's law of heredity this dethorning of the world's roses is quite possible.



From painting by Maud H. Purdy
Malus ioensis, one of the parents of the Redflesh Crab

Rosa rugosa, an extra-hardy shrub Rose



PLANTS FOR DIFFICULT CLIMATES

How to grow some trees and shrubs not generally considered hardy

Alice Horsfall

PLANT hardiness is an all-important topic to gardeners on the great plains. The Garden Dictionary says hardiness "covers the ability of the plant to survive no matter whether the hazard it must overcome is too much cold or heat or unfavorable factors such as drought." In the vicinity of Omaha, Nebraska the average growing season is 189 days, April 14 to October 20, with an average

rainfall of 25 inches, and temperature extremes from -20° to 100° F. The winter temperature fluctuates, with warm spells in January and February which start bud growth. Lack of snow for ground cover during cold periods is another drawback.

The Armistice Day storm of 1940, while very destructive to Nebraska growth, was in no way a typical storm. A mild autumn without a killing frost meant that the sap was still flowing and leaves were still out when a blizzard with snow and low temperature arrived. That combination may not come again for fifty years.

Yellow-wood (*Cladrastis lutea*)





Gottcho-Schlesner photo

Large specimen of Flowering Dogwood (*Cornus florida*)

Hardy Plants

Over a period of time a Nebraskan can have a fine garden of the trees, shrubs, and plants that have proved hardy in the State. These include lilacs, iris, peonies, as well as the viburnums, spireas, crab apples, and shrub roses, to name only a part. But few gardeners who read the horticultural magazines or visit gardens through the country can be content with the more familiar plants. Perhaps it is a question of the enchantment of distant fields; perhaps, a challenge to the gardener's own skill.

Less Hardy Trees

The flowering dogwood, *Cornus florida*,

may grow in the East as easily as "a weed tree," quoting from a recent magazine; but in this State it is a rare tree. Two trees were ordered from 2 Ohio firms; one was planted on a north slope with shade from the house in the winter afternoon; the other was put in an open border. But there was a difference in the trees, for the one with some shade had sturdier leaves; it has grown vigorously and never winterkilled; and it sets buds every fall, though late frosts have spoiled the blossoms some years. The other tree grew well in the summer and killed back in the winter, and was discarded at the end of 3 years. A yellowwood, *Cladrastis lutca*, from a New Jersey nursery, was planted on the clay

Branch of Flowering Dogwood (*Cornus florida*)

Elsie M. Kittredge photo





McFarland photo

American Mountain-ash (*Sorbus americana*)

slope near the dogwood. It again has never winterkilled, and is developing into a huge tree; it has a very good sense of weather, for its leaves turn in September and fall early in October regardless of frost. The katsura, *Cercidiphyllum*, another tree planted with bare roots, has prospered. The katsura was in the full face of the 1940 storm and had not lost its leaves; some of the branches on the southwest were injured; but in 5 years, new growth has completely covered the bare place. The 2 ginkgo trees are slower-growing but have so far been entirely hardy.

Experiences with the tulip-tree, *Liriodendron*, have been contradictory. The first tree came from Ohio, was planted where the water draining from the house roof reached it, and did well. A deceptively mild winter with too much warm weather in February killed the tree, though the root was still alive. And so, a new tree from an Illinois firm was planted the next spring; and so far it

has liked its home. The fact that there are several large tulip-trees in the city, which have survived storms and drought, makes the loss of the first one inexplicable. The mountain-ash, *Sorbus americana*, is an unusual tree here, because of heat and drought rather than cold. Chance, not intelligent planting, put it at the foot of a slope with some shade from the house; while its shape might have been improved by pruning, it was let alone; and so the recommendation of shade and no pruning for the mountain-ash is valid. The goldenrain-tree, *Koeleruteria paniculata*, is reported as short-lived in many cases; but a tree that grows as easily as it does with its generous bloom is worth having.

Some Failures

The trees which I have mentioned so far, with the exception of the mountain-ash, are all recommended for zone 3 by the Garden Dictionary. But not all of

Flowering branch of Tulip-tree (*Liriodendron Tulipifera*)

Elsie M. Kittredge photo





Fringe-tree (*Chionanthus virginica*), branch in bloom

the trees tried have done so well. The London plane-tree, *Platanus acerifolia*, grew well 2 years, and the third spring the trunks were gone. The sweet gum, *Liquidambar Styraciflua*, failed even with 3 trees tried in 3 different years. *Laburnum Vossii* failed to come through the winter, though 2 plants in succession were tried. A better growing season and an equable winter might have given these trees enough resistance to carry them through the first years.

Shrubs

Magnolia Soulangiana is grown here as a large shrub. The plant came balled-and-burlapped from an Illinois nursery. The magnolia did well for several years; then a peculiar winter with little snow and much warm weather killed two thirds

of the plant. Cut back, it started again, and bloomed in the summer that year; it now is about 8 feet high and equally broad. A small plant of starry magnolia, *M. stellata*, has taken longer to grow; in a partly sheltered place, it now is 4 feet high, and blooms well. As in other parts of the country, it does not always wait for the frost to go before blooming.

The white fringe-tree, *Chionanthus virginica*, usually loses a branch each year, but sends up new shoots and so constantly renews its growth. *Vitex macrophylla*, like the Buddleias, kills back to the ground in the winter. It is slow to start growth; and so every spring one goes through an anxious period, wondering if this year the Vitex has succumbed. Once started, it develops rapidly, and the 6- and 8-foot branches are covered with



M. Farland photo

Saucer Magnolia (*Magnolia Soulangiana*)

bright bloom for a long time. A peaty or acid sandy soil is recommended for the sweet pepperbush, *Clethra alnifolia*; and yet, placed on the east side of the rose trellis with a little ammonium sulfate scattered around, it has grown to be a huge bush; the little shade and acidity have satisfied it entirely.

With the roses hardiness seems to be chiefly a question of temperature in winter. All the roses have the soil hilled to 8 or 10 inches, and straw put around. The rose growers who write so glibly of taking the rose canes off the trellis and spreading them on the ground must have well-trained plants. The ramblers can be spread out; but the big canes of Paul's Scarlet, American Pillar, New Dawn, and Doubloons have to be left on the trellis and covered with straw and burlap. If the thermometer keeps away from 10° below except for a brief sortie, the roses will come through. One year a late frost after the sap had started killed many of the canes. The Horvath roses recommended for zero planting have not been a success. In 1945 Doubloons was the only climber that died back and did not bloom. Hercules does much the same, with 3 or 4 blossoms a year. It grows enormous canes but can not seem to harden them so that they will survive cold weather. Vanguard, another rose much advertised for hardiness, was a complete failure: either the canes died or there were no flowers. The gardener here does not have much choice about pruning his hybrid teas and perpetuals. He cuts down to live buds and is glad to have them. Some of the climbing roses, as Christine Wright or the newer King Midas, and the ramblers will bloom every year, but the good rose years when all bloom are memorable.

Growing azaleas outdoors in Nebraska is tempting fate; but for 2 years sturdy specimens of *Rhododendron molle* have bloomed well and grown. Ammonium

sulfate was used to acidify, and plenty of peat moss put in at the time of planting. The azaleas are on an east slope with protection from the west and some from the north; they may live only a few years but they will have paid their way in the owner's pleasure. The hardy crape myrtle, *Lagerstroemia*, advertised by an Ohio firm, has not proved hardy, though tried twice. As a substitute, crape myrtle is planted in large tubs kept on the garden terrace. Stored in the cold room in the basement in the winter, trimmed severely in the spring, the plants make fine growth in the summer with large blossoms. The tubs are full of roots, and so they have to be watered every day, and liquid fertilizer has to be applied frequently. *Abelia grandiflora* has done well, planted near the house. Dead wood has to be trimmed out in the spring, but the plant blooms well. The pink variety, Edward Goucher, is apparently more tender, for it dies the first winter.

Conclusions

What do the experiences mentioned here show as to hardiness? One fact is that nurserymen and horticultural writers are usually conservative in their recommendations. Another is that the first year is the test of the plant's ability to adjust to a new habitat. Since it is necessary to order planting stock from a distance, one naturally takes the smaller sizes, and gains thereby. Late March or early April is the best planting time.

The last essential in trying new plants is room for experiment. Some need full sun, others part shade or protection from the southwest winter sun; some need clay, or peat, or acid soil. Unless the garden is large enough to provide these varying conditions, no one has the right to say "that plant is not hardy in this particular area."

NEW AMERICAN LILACS

Why they are needed, and how obtained

F. L. Skinner

AMONG all the flowering shrubs that can be grown generally throughout the North Temperate Zone the modern forms of the common lilac are probably the most popular. Not only have they beauty of form and color but they also have fragrance and sentimental appeal: so many people remember the old lilac bush that was a favorite of their childhood days. Unfortunately over 80 per cent of the named varieties of the common lilac that are on the market at the present time were raised in France and were selected on the basis of their

performance in the climate of that country. On this continent there are many districts with a climate less favorable for the lilac than that of France. In the North our severe winters frequently injure these choice lilacs so badly that it takes them several years to recover. Farther south the hot summers affect them rather adversely; lilac bushes seem to suffer from the heat of the summer in some districts of Maryland almost as much as they do from the severity of the winter in northern Manitoba. On the eastern slopes of the Rockies there are districts where, though the bushes are quite hardy, late spring frosts usually destroy the flowers in the bud stage.

It would seem therefore that if we, throughout this American continent, are to enjoy lilacs to the fullest extent, we shall have to raise our own varieties: varieties that are suited to our diverse climatic conditions. I think that the desired result cannot be achieved by merely crossing the present forms of the common lilac; it will be necessary to bring in fresh "blood." In my opinion the form of *Syringa oblata* var. *dilatata* collected by Wilson on the Diamond Mountains of Korea will help in raising American lilacs that will be satisfactory over a wider stretch of our territory than the so-called French varieties. While I was on a visit to the Arnold Arboretum in the autumn of 1918 the late Professor Sargent showed me this lilac (*S. oblata* var. *dilatata*) and arranged for me to have a few 1-year seedlings.

Early Hybrids

Now take a look at an atlas: it will be noted that the Diamond Mountains of Korea are near latitude 38, approximately the same as that of Washington, D. C., or the heel of the Italian "boot." Never-

Flowering branch of *Syringa oblata* var. *dilatata* (Fig. 1)

McFarland photo



theless these lilacs are perfectly hardy at Dropmore, near latitude 51, and at an elevation of 1800 feet above sea level, where temperatures lower than 40° below zero are a yearly occurrence. Seeing that these lilacs were much hardier than the named varieties of the common lilac, I took the first opportunity (1921) of crossing some of the named common lilacs with the pollen of *S. oblata* var. *dilatata*. These hybrid seeds germinated under glass in 1922; a few of them flowered in 1923, and most of the remainder by 1926. These first hybrids of *S. oblata* var. *dilatata* are not so handsome as the modern French varieties. Yet the facts that most of them do not sucker, that many of them have handsome foliage that turns deep purple in autumn, and that they are sufficiently hardy to flower very freely every year (only once have their flowers been injured by spring frosts, and they have never shown winter injury) made me believe that there was a place for them in the colder districts of this continent; and so six varieties were named.

Later Hybrids

Later favorable reports from points as far distant as Colorado and Illinois led me to think that lilacs of this type of breeding might have more than a local field of usefulness; and so, many further crosses were made, principally with a view of getting better varieties in the pink and pale blue tints.

Not only were some of the best of the Lemoine varieties of the common lilac used, but pollen of both *S. persica* and *S. pinnatifolia* were obtained from further south and used successfully on my hybrids of *S. o. dilatata*. None of the *S. pinnatifolia* hybrids has yet flowered; but those having *S. persica* in their pedigree are extremely free-blooming shrubs with delicately fragrant flowers that are larger than those of *S. persica*.

A large number of 4-year-old bushes of the hybrids with the named varieties of the common lilac, and also a few 2-

and 3-year-olds, flowered in 1945. These were a very fine lot, and probably half of them would bear comparison with varieties that are usually considered among the 100 best lilacs. Many of them flowered about a week earlier than any of the common lilacs. Photographs were taken of a number of these early-flowered forms and, for comparison, one of a good spike of President Grevy. These photographs were all taken the same day and the same distance from the camera. Fig. 3 was cut from a 3-year-old bush and is one of the dark-flowered forms, Fig. 4 is from a white variety and a 4-year-old bush, while Fig. 5 is President Grevy. Comparison of these photographs will give a fair idea of the season, and of the size of individual spikes. Among those that flowered later were some with large spikes of good-sized flowers in the pale gentian-blue tints, that are quite distinct and worthy of a place in any collection of good lilacs.

Lilac President Grevy—branch in full bloom (Fig. 2)

McFarland photo



This work of raising a type of "American" lilacs that will be better suited to our continental climates than many of the "French" lilacs has merely begun;

and it is possible that other species of the vulgaris section of the genus *Syringa* may add their quota of beauty and adaptability to the new race.

Fig. 3



Fig. 4



Fig. 5



Author photo

Figs. 3 and 4: Hybrids between the Common Lilac and *Syringa oblata* var. *dilata*. Fig. 3, dark-flowered; Fig. 4, double white. Fig. 5: Lilac President Grevy, photographed on same day as hybrids.

SMALL BULBS IN A NEW JERSEY GARDEN

Blooming from January to July

Marion Thornton Rowley

IN our northern New Jersey garden the small bulbs are the first joys of spring. The soil of four and a half gently sloping acres is a fine sandy loam which gives the good drainage so essential for success with bulbs. As my husband and I do our own gardening, we are able to watch for and take care of the tiny seedlings that appear when these small bulbs are well established.

January to March

Facing south, where the sun is hot in the summer, are groups of Snowdrops (*Galanthus nivalis*) and Winter Aconite (*Eranthis hyemalis*). The Winter Aconite is like a big yellow Buttercup, growing only a few inches high. In this protected place, it blooms from late January through March.

Early in March, while snow may still be on the ground, the first Crocuses push up. Earliest is Dorothy (a variety of *Crocus chrysanthus*), yellow, feathered grey; this is followed shortly by *Crocus*

chrysanthus E. P. Bowles, a good yellow, marked with purplish feathering at the base; *Crocus Sieberi*, soft lavender, with bright red stamens; and the better-known Cloth-of-gold (*Crocus susianus*). With us the Cloth-of-gold has been an enduring Crocus for many years; but the Cloth-of-silver (*Crocus versicolor*) tends to disappear. These kinds are among many that bloom before the big, fat Dutch Crocuses, but they are not so satisfactory to cut for the house. They are fragile and fairy-like, with petals like thin gauze, though well inured to cold. When they are brought from the cold earth into the warm house, they often seem to dissolve like the Snow Maiden near the fire.

April

Following these, during April, comes a great garden spectacle, a long ribbon of vivid blue Squills. They have been planted, group after group, through the years, until the ribbon is now 80 feet long, becoming more colorful as the bulbs increase. While we have used some

of the ordinary *Scilla sibirica*, most of our Squills are its taller, longer-lasting, bright Delphinium-blue variety, Spring Beauty. The planting, which is fragrant as well as colorful, brings passers-by to the door to ask, "What is the blue, and where can we buy it?" Even small flowers can make a wonderful display if they are planted in quantity.

Opening fast, with or just after the Squills, are Glory-of-the-snow (*Chionodoxa Luciliae*) and *Hyacinthus ciliatus* (listed in catalogs as *Hyacinthus azureus* or *Muscari azureum*). Glory-of-the-snow produces light blue, white-centered, starry flowers that face the sky. The Hyacinth has spikes, a few inches high, of delicate light blue bells. Although it looks much like a Grape-hyacinth, it does not grow so strongly or spread so rapidly. A little later comes the best of the Grape-hyacinths, *Muscari armeniacum*. The Yellow Fritillary (*Fritillaria pudica*) blooms with these, with bells on stems 9 or 10 inches high. It has proved itself hardy, and seeds itself. Also blooming with these are the long-lasting *Tulipa biflora* var. *turkestanica*, with several tiny

Spring Adonis (*Adonis vernalis*)



cream-and-pink flowers to a stem; and *Tulipa sylvestris* (also listed as *Tulipa florentina*), with drooping yellow flowers valuable for their fragrance and graceful stems. *Tulipa sylvestris* is one of the more dependable wild Tulips. The Spring Adonis (*Adonis vernalis*)—not a bulb, but like a larger Winter Aconite—blooms at this time; and also the bulbous *Iris reticulata*, dark purple-blue, scented like Violets. This Iris is supposed to be grown in sun; but neighbors of ours have just bought a place where it is well enough established to have appeared unexpectedly in a partly shaded spot. [See color plate.]

The blue Roman Hyacinths (*Hyacin-*

thus orientalis var. *albulus*) follow in less than a week. They are slender and dainty; and they are perfectly hardy here, in spite of the general belief that they are tender.

As April advances, many more bulbs are in bloom. *Fritillaria ruthenica*, with red-purple flowers delicately checkered, blooms with our native Dutchmans-breeches and the Water-lily Tulip (*Tulipa Kaufmanniana*). This Tulip is short-stemmed, cream and yellow inside, and creamy yellow outside with soft carmine stripes. It stands more hard treatment than any other that I know. It will bloom in poor soil, and will survive transplanting at almost any time;

Water-lily Tulip (*Tulipa Kaufmanniana*)



and so the many attractive new varieties seem well worth trying.

In the latter part of April, a few Crocuses are still in bloom, and a great deal of *Puschkinia scilloides*, a blue and white striped relative of the Scillas. This is charming and dependable; each flower stalk bears several little bells, like a miniature hyacinth.

May

About the first of May, *Tulipa Eichleri* comes into bloom, with its large scarlet petals abruptly pointed. A lot of Fritillaries open at this time. Artemis, Aphrodite, Thunbergii, and many others, varieties of the Checkered-lily (*Fritillaria meleagris*), in white, pink, purple, and lavender, have been in our garden for years; they have seeded themselves, and grown into fine plants, some with stems almost 2 feet high. We find that Fritillaries are apt to make a meager growth the first year, with perhaps only one or two bells to a stem. It takes three or four years for them to develop to their finest. The Scarlet Fritillary (*Fritillaria recurva*), and the Pink Fritillary or Adobe-lily (*Fritillaria pluriflora*) never do well with us. Both Californians, they do not seem able to withstand our climate.

Several interesting Grape-hyacinths bloom from late April into May. The "Musk-hyacinth" (*Muscari moschatum minus*) opens toward the end of April. Green-flowered and quaint, its fragrance is its best asset. *Muscari latifolium* grows almost a foot high, with broad leaves; it has urn-shaped flowers, violet to black at the bottom of the flower cluster, pale hyacinth-blue at the top. *Muscari paradoxum* blooms early in May. It is a beautiful grayed blue, with a dull grape-like bloom, and has fine long stems that make it good for cutting. *Muscari neglectum* is another that is fragrant, its small dark blue bells edged with white. Very lovely is *Muscari botryoides* var. *album*, sometimes called "Pearls of Spain," from a distance seeming to shine

with a white light. There is a new improved variety.

About the middle of May a true Hyacinth (*Hyacinthus amethystinus*) opens its small blue bells; it is smaller and more graceful than the common or "Dutch" Hyacinths (*Hyacinthus orientalis*). Later comes still another Grape-hyacinth, the "Tassel-hyacinth" (*Muscari comosum*), looking quite unlike the others. The lower flowers stand out at an angle from the stem, while the upper ones stand up in a cluster. A variety of the "Tassel-hyacinth" (*Muscari comosum* var. *monstrosum*, also called *Muscari plumosum*) has its flowers shredded into finely fringed segments. For five or six dry springs the fine big buds blasted; but the last two springs, with plenty of rain—how it did bloom!

The "Tassel-hyacinths" may be said to bring to a close the spring bloom of small bulbs in our garden, though Alliums pick up the bloom in late spring and continue it well into the summer.

Seedlings

One important thing we have learned from growing these small bulbs is not to weed too soon or too often until late in the season. In this way, seedlings are not destroyed, and the ground is kept moist. In the middle of the summer we sprinkle the beds of little bulbs with a special mixture made as follows: $\frac{1}{4}$ bone meal, $\frac{1}{4}$ Driconure, $\frac{1}{4}$ sifted compost, $\frac{1}{8}$ sand, and $\frac{1}{8}$ peat-moss. This is put on about $\frac{1}{4}$ inch thick, covering the tiny seeds that otherwise sprout like fine grass right on the surface of the ground. It acts as a mild, slow fertilizer, and offsets the baking of the earth.

Some of the small bulbs we grow can be found in most bulb lists, but others are found only in the lists of a few bulb specialists. The interest and variety that the unusual kinds give to the garden make it well worth while to go to the trouble of seeking out a few new ones to add each year.

LAYOUT OF THE SMALL PLACE

How a family made and executed their own plans

William H. Frederick, Jr.

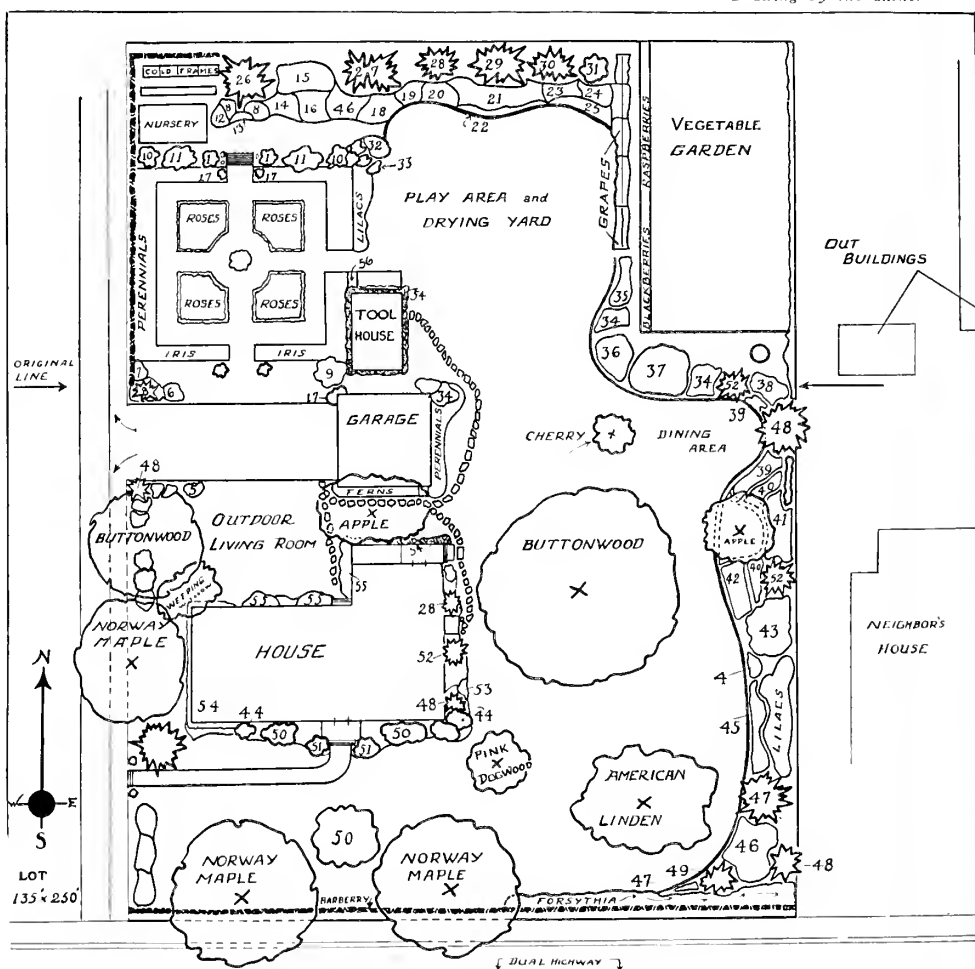
WHEN our house was built and the property planted, my parents' interest in gardening was just beginning, and the amount of money that could be

spent for trees was limited. The surrounding countryside was relatively unpopulated. Since then, the city has grown out to meet us; and as happens in so many cases, the original needs have changed and expanded, and our interest in gardening has grown.

We have done all planning and most of the planting ourselves. Our labor force is a family of four: mother, father, and

Planting plan

Drawing by the author



two sons. Through gifts from gardening friends, by buying small nursery-grown plants and carrying them for a few years in our own nursery, and by propagating numerous plants in our own cutting frame, we have kept expenses at a minimum. We have found this to be a most satisfying and rewarding kind of gardening.

Early Plantings

The first planting consisted of shade and fruit trees, some of which still exist and are shown on the plan. Three really fine specimens dating from the first planting are a dwarf Yew in the center of the front lawn, a Blue Spruce, and a berry-bearing American Holly.

The original foundation planting of *Chamaecyparis* soon grew so big that it

was hard to find the house behind it. It was replaced by forms of the Japanese Yew and Holly on the front, and Hemlock, Mountain-laurel, and Holly on the side. These look well with the house and the old specimen Yew.

The outdoor dining area is near the kitchen door, in the shade of Apple and Cherry trees, and near the fine Holly so that we can enjoy this tree more. A short Hemlock hedge cuts off the view of our neighbor's back door; and heavy planting along this boundary and at the front corner gives privacy from neighbors and highway.

Expansion

As our interest in gardening grew and our needs expanded, we found ourselves cramped for space. The original lot was

KEY TO PLANTING PLAN

- | | |
|--|---|
| 1. <i>Spiraea Vanhouttei</i> | 28. Carolina Hemlock (<i>Tsuga caroliniana</i>) |
| 2. Mock-orange (<i>Philadelphus</i>) | 29. Deodar Cedar (<i>Cedrus Deodara</i>) |
| 3. Dwarf Japanese Quince (<i>Chacnomcles japonica</i>) | 30. Austrian Pine (<i>Pinus nigra</i>) |
| 4. <i>Weigela</i> | 31. <i>Cryptomeria japonica Lobbii</i> |
| 5. Lilac Charles Joly | 32. <i>Viburnum Carlesii</i> |
| 6. Hugo Rose or Golden Rose of China (<i>Rosa hugonis</i>) | 33. American Arbor-vitae (<i>Thuja occidentalis</i>) |
| 7. Japanese Maple (<i>Acer palmatum</i>) | 34. <i>Forsythia</i> |
| 8. Firethorn (<i>Pyracantha</i>) | 35. Rhubarb |
| 9. Weeping Japanese Cherry | 36. <i>Cotoneaster salicifolia</i> |
| 10. Flowering Dogwood (<i>Cornus florida</i>) | 37. Hawthorn (<i>Crataegus</i>) |
| 11. Flowering Crab Apple | 38. Kousa (<i>Cornus Kousa</i>) |
| 12. Scotch Broom (<i>Cytisus scoparius</i>) | 39. Snow Azalea (<i>Rhododendron mucronatum</i>) (<i>Azalea ledifolia</i> var. <i>alba</i>) |
| 13. Swiss Mountain Pine (<i>Pinus Mugo</i> var. <i>Mughus</i>) | 40. <i>Rhododendron caucasicum</i> Boule de Neige |
| 14. Beauty-bush (<i>Kolkwitzia amabilis</i>) | 41. Rose Bay (<i>Rhododendron maximum</i>) |
| 15. European White Birch (<i>Betula pendula</i>) | 42. Flame Azalea (<i>Rhododendron calendulacum</i>) |
| 16. Snowberry (<i>Symphoricarpos albus</i>) | 43. <i>Magnolia Soulangiana Lemoii</i> |
| 17. Japanese Box (<i>Buxus microphylla</i> var. <i>japonica</i>) | 44. Hicks' Yew (<i>Taxus media</i> var. <i>Hicksii</i>) |
| 18. <i>Syringa microphylla</i> | 45. Bridal Wreath (<i>Spiraea prunifolia</i>) |
| 19. <i>Euonymus yedocensis</i> | 46. Winged Euonymus (<i>Euonymus alatus</i>) |
| 20. Beauty-berry (<i>Callicarpa japonica</i>) | 47. Blue Spruce (<i>Picea pungens</i>) |
| 21. Japanese Yew (<i>Taxus cuspidata</i>) | 48. American Holly (<i>Ilex opaca</i>) |
| 22. Azalea—Kurume hybrid | 49. Tigertail Spruce (<i>Picea polita</i>) |
| 23. <i>Viburnum Burkwoodii</i> | 50. Dwarf Japanese Yew (<i>Taxus cuspidata nana</i>) |
| 24. Fringe-tree (<i>Chionanthus virginica</i>) | 51. Japanese Holly (<i>Ilex crenata</i>) |
| 25. Spreading Cotoneaster (<i>Cotoneaster divaricata</i>) | 52. Hemlock (<i>Tsuga canadensis</i>) |
| 26. Atlas Cedar (<i>Cedrus atlantica</i> var. <i>glauca</i>) | 53. Mountain-laurel (<i>Kalmia latifolia</i>) |
| 27. China-fir (<i>Cunninghamia lanceolata</i>) | 54. Japanese Barberry (<i>Berberis Thunbergii</i>) |
| | 55. Hydrangea |
| | 56. Privet (<i>Ligustrum vulgare</i>) |



Author photo

Early foundation planting—outgrowing the house

135 × 150 feet. We lacked an ample drying yard, and an open area for such games as badminton and croquet. We wanted a vegetable garden, flower garden, and tool house; and room for nursery, cold frames, and compost pile. The purchase of an extra 100 feet at the back made it possible to place the drying yard and vegetable garden to the east, near the kitchen door, and to have a formal garden on the west in full view of the living room. The tool house, behind the garage, is conveniently located between the two gardens; and the space between tool house and garage left an excellent spot for woodpile and refuse containers.

The Grapes, Raspberries, and Rhubarb occupy a prominent position, because we believe they deserve a place with the ornamentals. The areas in front of the vegetable garden, along the new back boundary, and around the formal garden give room to try many plants that are new and interesting to us.

The area between the house and the driveway has always been the outdoor living room, protected from the road, well shaded, and connecting with the back hall door of the house. The new flower garden connects closely with this. The driveway, which was at the back of the original lot, seems (on the plan) to cut these two areas apart. In reality, however, it is not conspicuous. The lawn comes up to it at the same level on each side, and the plantings along the side of the property bring the old and new sections together.

Future

The layout, changing as our needs change, will probably never reach a completely static condition. We shall need to remove plants which do not stand the test of time, leaving more space for those which have worn well and for newer ones of greater desirability. Most important, changes that will minimize the upkeep will become necessary when the labor force is decreased by the two sons' moving out to homes of their own.

The house is no longer smothered, with the new foundation planting

Author photo



IRIS CLASSIFICATION

Characteristics and requirements of the important groups and sections

John C. Wister

ACCORDING to which botanical authority we choose to follow, there are from 150 to more than 300 species of *Iris*. No one person has ever attempted to grow them all, or even to learn them all.

The modern gardener need not worry about the difficulty of learning a great many species. It is far simpler for him to divide the genus roughly into seven groups, and then to learn the conditions each of these groups requires. From the garden point of view, the first four groups are the most important.

1. Bearded (Pogon)

The central ridge of the lower "petals" (falls) has a beard-like growth; the leaf is broad and sword-like; and the rhizome is large and heavy. The wild types (about twenty-seven in number) come mostly from southern Europe, North Africa, and Asia Minor, where they are accustomed to heat, blazing sun, and drought. Therefore the plants should be given the sunniest position in the garden, and the best-drained (including air drainage).

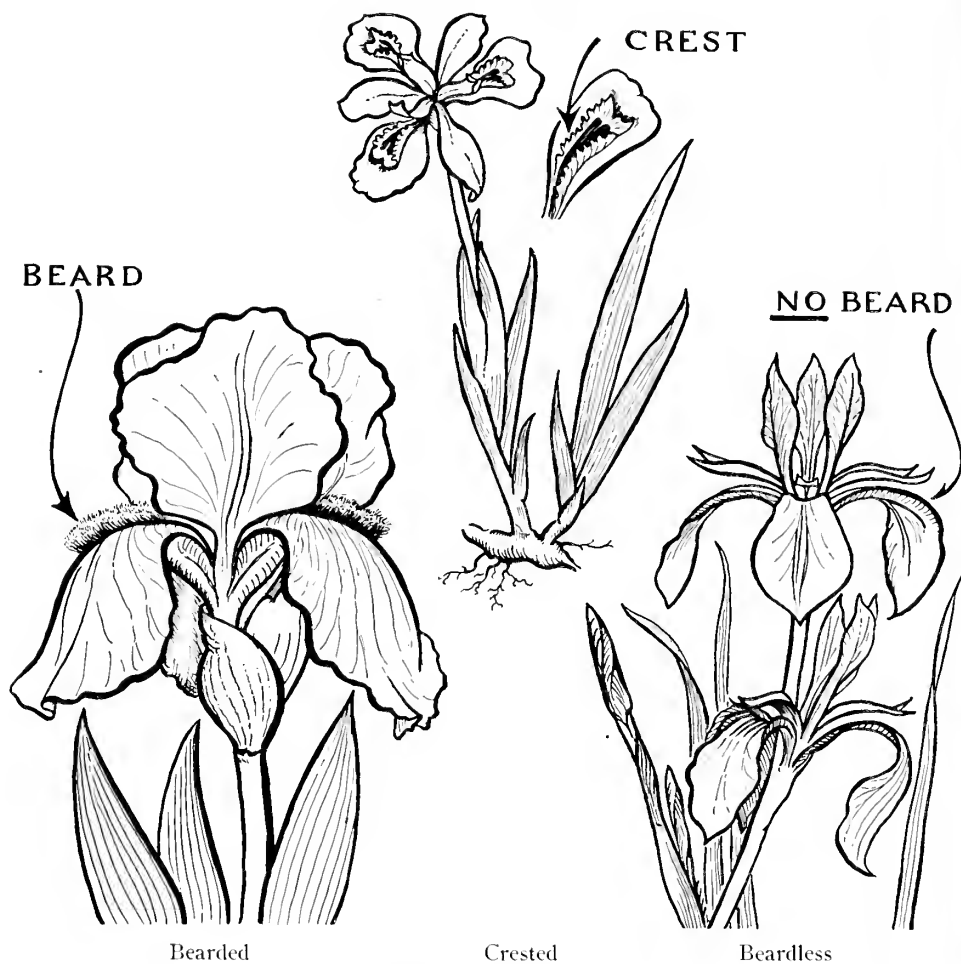
Bearded Irises are commonly called Flags, and are erroneously termed "German" Irises. Two species, *Iris pallida* of Italy and nearby countries, and *Iris variegata* of Hungary, are believed to be the parents of practically all the Tall Bearded Irises of our gardens that were originated before 1900. About that time, larger-flowered wild types like *Iris trojana* and *mesopotamica* and their relatives

were brought in from Asia Minor and were crossed with the best garden Irises of that day. The resulting plants have taller and better-branched stalks, and larger flowers. They created a sensation by their size and beauty; but unfortunately, as garden plants, they were not so rugged as the older varieties. They did not easily withstand cold wet winters, and they were more susceptible to rot. Skilled breeders have now worked half a century to overcome these faults, and have in a large measure succeeded in doing so.

These hybrids are still often called German Irises, although they are not descended from or particularly closely related to the species that Linnaeus named *Iris germanica* in the mistaken belief it came from Germany. They bloom in mid-May in New York, while the popular present-day hybrids flower about the first of June.

In the Alps and in the mountains of eastern Europe are found various dwarf Irises now termed Dwarf Bearded, and flowering in late April. The members of this group, crossed with Tall Bearded Irises, have produced a race conveniently called Intermediate Bearded, as they are intermediate between their parents both in height and in season of bloom. Those that have a tendency to produce some flowers in October and November are now grouped as Fall-blooming.

Bearded Irises have also been crossed with *Oncocyclus* species, and the resulting plants are usually referred to as Miscellaneous Bearded. They have some of the queer markings of their eastern parents. They can be grown, with a little care, in most parts of this country; but they are neither so hardy nor so sturdy as the Bearded Iris, and should be given greater care.



The three types of Iris flowers

2. Beardless (Apogon)

The central ridge of the fall is smooth, the leaves are narrower and more grass-like, and the rhizome is slender. This group includes the largest number of species (about fifty), distributed around the globe in the North Temperate Zone. They extend from western Europe east through Siberia and China to Japan. They grow from Alaska and California to Labrador and Florida. Most of the species grow better in moist places, or

only in such situations. This great group can be split into four sections of some garden importance (the first four mentioned here), and various minor sections.

Sibirica Section includes *Iris sibirica* and *Iris orientalis*, which are the parents of the modern varieties termed Siberian Irises. These are magnificent plants and easily grown. Among the nine species are also *Iris Bulcyana*, *Delavayi*, *Wilsonii*, *Chrysographes*, and *prismatica*, which are less frequently seen in gardens.



IRIS WILLIAM MOHR, the most popular hybrid
between the Bearded and the Oncocyclus Iris.
Named for the California breeder who produced it.



YELLOW FLAG (*Iris Pseudacorus*), a Beardless Iris
native to European swamps and streamsides,
often escapes from cultivation in this country.
It grows with great vigor in moist places.

ROOF IRIS
(*Iris tectorum*)
a Crested Iris
planted by the Japanese
on the thatched roofs
of their houses.



IRIS MOUNTAIN SKY



exemplifies
the present-day
ideal flower form
of Bearded Iris.



IRIS
FULVA

IRIS
FOLIOSA

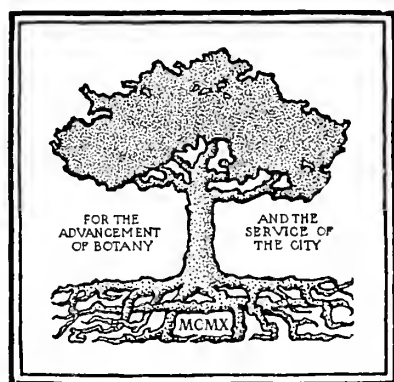
DOROTHEA
K WILLIAMSON

Iris fulva and *Iris foliosa*

(members of the Hexagona Group) are native in the southern United States and northward in the Mississippi Valley. They have been crossed to produce the variety Dorothea K. Williamson.

BROOKLYN BOTANIC GARDEN RECORD

PLANTS & GARDENS



VOLUME 3, NEW SERIES

1947

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Examples of seedlings of Dorothea K. Williamson, showing the great variation in flower color. These were produced by pollinating the flower with its own pollen. See the article in this issue, "Irises of the Southern United States," by George M. Reed.

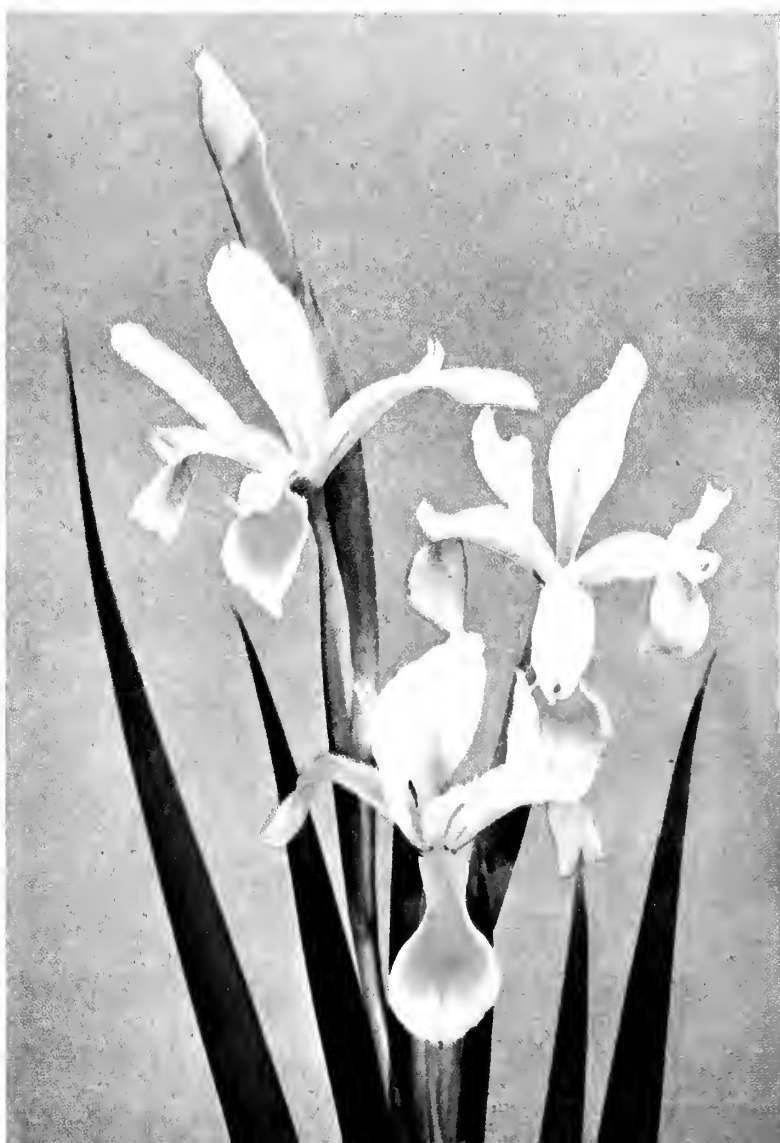




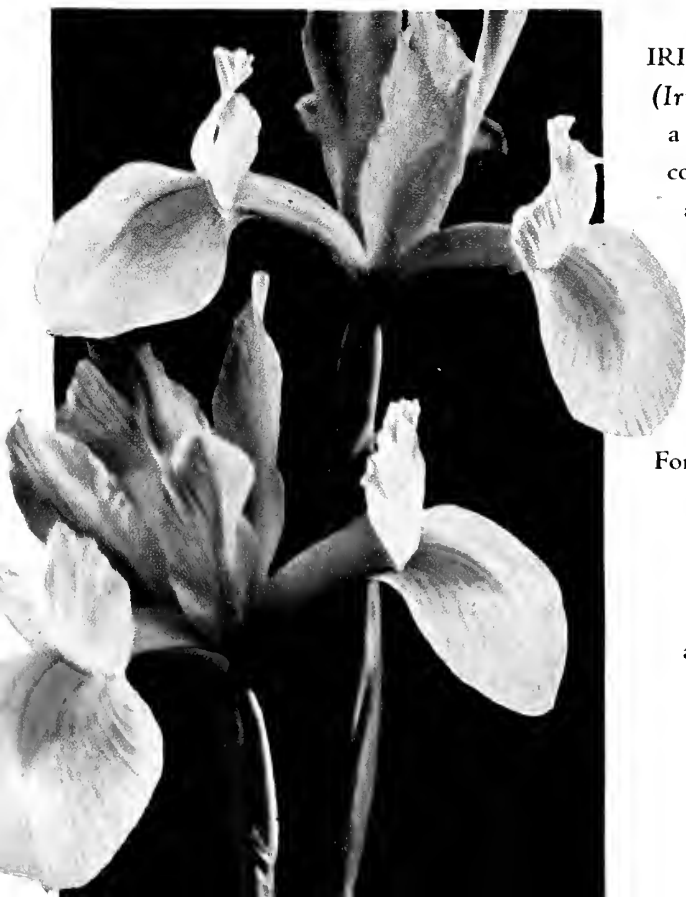
SIBERIAN IRIS (*Iris sibirica*), a Beardless Iris
native to the region from Central Europe to Russia.

It grows in moist places
(but does well also in gardens without irrigation)

¶*Iris ochroleuca*, a Beardless Iris
native in western Asia Minor.
Blooms in late June and July,
long-lasting as a cut flower.



Iris reticulata
the most popular
of the
early-flowering
Dwarf
Bulbous Irises.



IRIS WEDGEWOOD
(*Iris tingitana* hybrid)
a bulbous variety
commonly forced
and sold as a
cut flower.

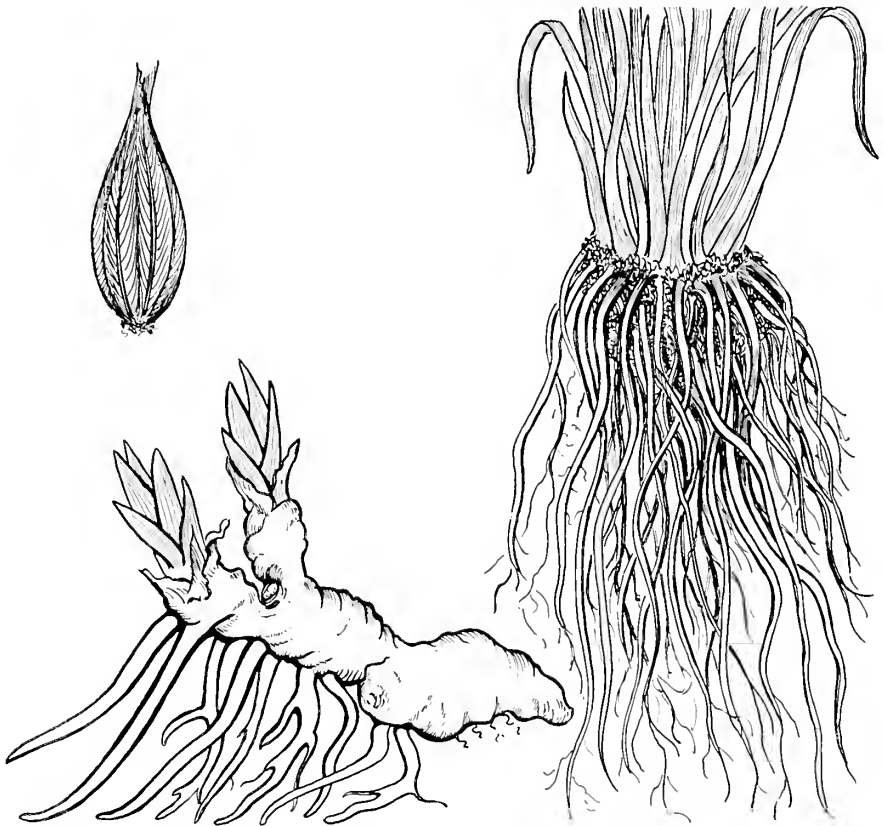
For outdoor growing
in the North,
it is planted
in November
and given
a winter mulch.

Spuria Section. The five species of this group grow in Spain and eastward to Persia. They are not good in extremely cold climates, but can be successfully grown in New York and New England. Some botanists consider *Iris halophila*, *ochroleuca*, *Monnierii*, and *amra* as distinct species, and others call them subspecies or varieties of *Iris spuria*. All are handsome plants. *Iris graminea* has little beauty, but some of its forms are deliciously fragrant.

Laevigata Section. The four species of this group encircle the world. *Iris versicolor* grows around Hudson Bay and southward along the Atlantic coast. The yellow *Iris Pseudacorus* grows all over Europe; and *Iris laevigata* and *Iris Kacupferi* are Chinese and Japanese. The last-named is the parent type of the famous Japanese Iris.

Hexagona Section, natives of our southeastern States. Old-time botanists included here only *Iris hexagona*, *fulva*,

The three types of underground parts of Iris



Bulb (above)

Rhizome

Fibrous roots

and *foliosa*, and one or two others. Some modern botanists state that there are about 300 species in this section, while others present evidence to show these so-called species to be hybrids. (See the article in this issue on Irises of the Southern United States, by George M. Reed.)

MINOR SECTIONS

California Section (eight species), includes *Iris Douglasiana*, *tenuis*, *bracteata*, *tenax*, *tenuissima*, *Purdyi*, and *macrospiphon*. They are mostly from our Pacific coast. All are comparatively small. East of the Rockies they are not too easy to grow, and are best used for rock gardens.

Scarlet-seeded Section has one species only, *Iris foetidissima* of Europe, valuable only for its unique and attractive seeds.

Ungicularis Section. Only one species is commonly grown: *Iris unguicularis*. It is popular abroad under the name *Iris stylosa*; and it succeeds in this country as far north as Richmond, and even to Washington, D. C. It flowers in December and January.

Ensata Section has only one species, *Iris ensata* of Asia.

Longipetala Section consists of three species: *Iris longipetala* of the California seacoast, and *Iris missouriensis* and *Iris montana* of the Rocky Mountain States.

Tripetalous Section has two species. *Iris setosa* circles the colder regions of the globe: is found in Maine, Labrador, Alaska, Japan, and northern Asia. *Iris tripetala* grows from North Carolina and Tennessee to Florida.

Verna Section. *Iris verna*, the only species, grows from Virginia to Alabama. It is a botanical curiosity, having features of both the Bearded and the Beardless Iris Sections.

3. Bulbous

These Irises have true bulbs (not rhizomes), and can be handled like Tulips. The wild prototypes come mostly from



Iris Xiphium—bulbous (and beardless)

the Mediterranean region, extending eastward through Asia Minor. They are important on the west coast, and in the East as far north as Richmond. There are about thirty-three species, in three important sections.

Juno Section. Many of the twenty species are curiosities rather than important garden plants. Some of the more important ones are *Iris persica*, *alata*, *sindjarensis*, *orchioides*, and *bucharica*. The bulbs of this section have fleshy roots which are persistent during the resting season. The roots of the bulbs of the other two sections do not so persist.

Xiphium Section. The bulbs have smooth membranaceous outer coats. The most important of the six species are *Iris xiphoides*, *Xiphium*, *filifolia*, and *tingitana*. They are the parents of varieties and hybrids that are grown by the million for cut flowers under the popular names of Spanish, Dutch, and English Irises. They are good garden plants in mild climates, but not in the North.

Reticulata Section. The bulbs have netted (reticulated) outer coats. There are seven species in the group. The important ones, *Iris reticulata* and *Iris histrioides*, are lovely tiny rock garden plants, blooming in late March and early April. They come from Asia Minor.

4. Crested (Evansia)

The central ridge of the fall has a raised crest which does not split into hair-like threads. There are only six species in this group. They are native in our southeastern States and near the Great Lakes; also in Japan and China.

The American species are *Iris cristata* (a woodland plant of our southern mountains, and hardly farther north); and its close relative, *Iris lacustris*, from the sand dunes of our Great Lakes. Among the Japanese species are *Iris gracilipes*, the most charming imaginable little rock garden plant; and the Roof Iris (*Iris tectorum*), and its white form, *Iris tectorum album*. The last two are best raised from seed; they are often not too long-lived under our conditions, as they succumb to wet winters.

5. Oncocyclus

The species are native in Asia Minor, Syria, and Persia, and are difficult to grow in this country except on the Pacific coast. The stem is single-flowered, and the flowers have very curious markings.

The best-known of the fourteen species are *Iris paradoxa*, *iberica*, *Gatesii*, *Lortetii*, and *susiana*. The last is a commercial cut flower in California.

6. Regelia

The species of this group grow farther east than the *Oncocyclus* species; they are more adaptable to cultivation, although they are by no means easy to grow in most of our gardening sections. They need a warm, well-drained soil, and a summer period of rest. The stem is one-headed but two- to three-flowered. The important species (of the four in the group) are *Iris stolonifera* and *Korolkowii*.

7. Dichotoma

The only species of this group, *Iris dichotoma*, is unlike all other Irises in that it is a biennial and so must be renewed from seed. It flowers in August, and is of little importance.

A planting of Tall Bearded Irises



HOW TO PLANT THE VARIOUS IRISES

When and where to plant, and how to prepare the soil

Frederick H. Moore

PROPER soil preparation is important for the growing of any plant. The Irises are tolerant of poor growing conditions, but they do not attain their maximum growth or quality without discriminating soil preparation and care.

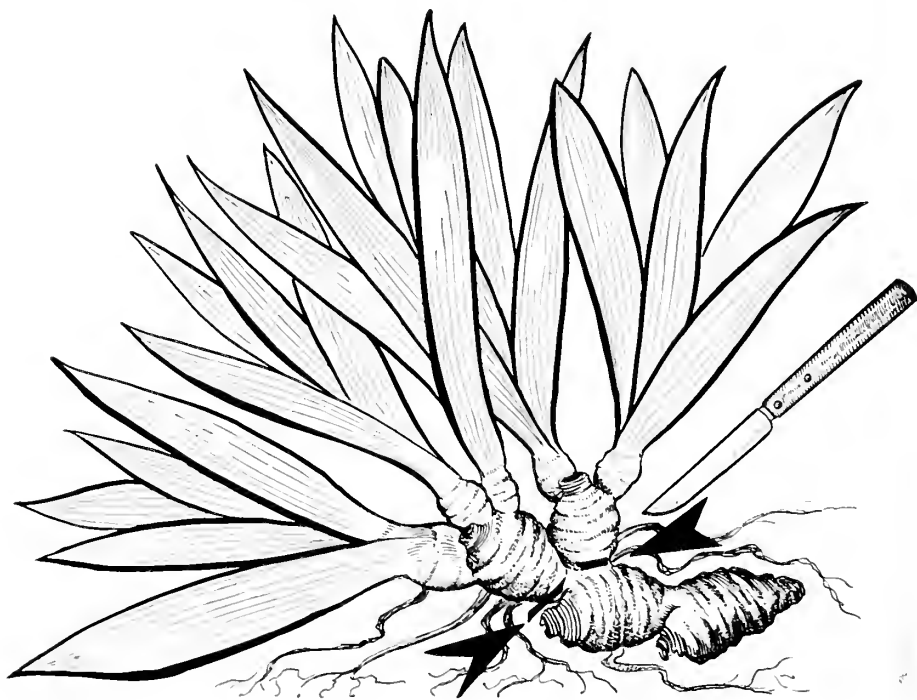
Bearded Iris

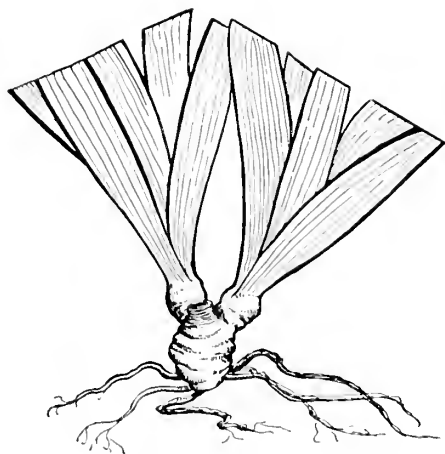
The members of this group need lime. The soil should be tested, and enough lime added to bring it to the neutral point. Planting may be done at almost any time.

The best time is immediately after flowering. Strong single divisions should be planted, not clumps. If they grow as they should, they will require dividing and re-planting about every four years.

For ideal growing conditions, a location with plenty of sun, good circulation of air, and natural soil drainage is best, with beds thoroughly and deeply prepared. Excavate the soil to a depth of 15 inches. If hardpan should be encountered, relieve this condition by breaking up and incorporating coarse stony material, always keeping in mind the fact that there must be good drainage. Fill the first 11 inches (which will be well below the rhizomes) with a thoroughly mixed preparation of one third well-rotted cow manure and two thirds soil.

Dividing a rhizome of Bearded Iris





A division ready for replanting

To this 11 inches add and mix well 2 pounds super-phosphate and 1 pound ground limestone for every 5 cubic feet. Tramp well, and then add 6 inches of good soil. If heavy, make light by incorporating gravel. In the top 6 inches incorporate 10 pounds of bone meal and 5 pounds of ground limestone for each 100 square feet. The bed should now be about 2 inches above the surrounding ground, which aids in drainage.

In planting, leave the top part of the rhizome exposed. This helps drying and ripening. Too deep planting may be fatal in wet years. If a group is wanted, three or more rhizomes of the same variety may be planted about a foot apart.

Dig a hole 15 inches deep



Rhizomes of different varieties should be at least 2 feet apart. Fertilize annually with bone meal, worked well into the soil.

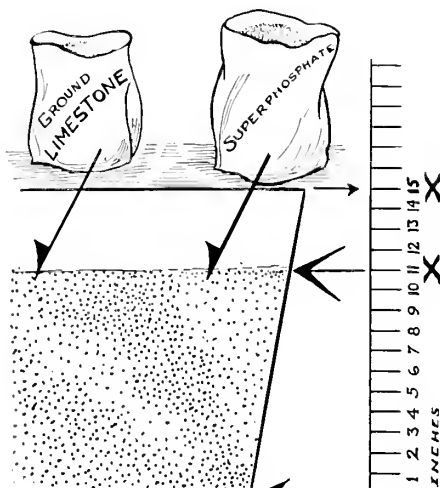
Bearded Irises may be divided as soon as they finish flowering; thus they will be able to make their new growth and flower buds for the coming year in their new locations. The rhizomes should be separated gently, and cut where necessary. The strongest divisions are planted; the small, weak ones discarded. The foliage should be cut back to 2 or 3 inches.

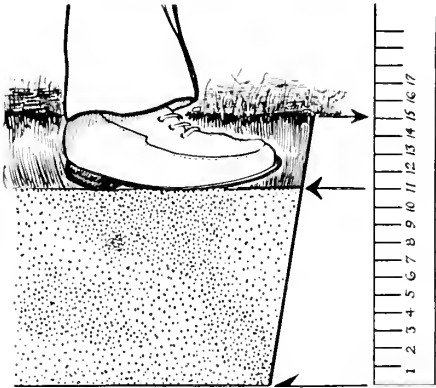
Beardless Iris

The members of this group thrive in moisture but not in lime. Our native Larger Blue Flag (*Iris versicolor*), of varied shades of blue-purple, and the European Yellow Flag (*Iris Pseudacorus*) are about the only two aquatic Irises. Other species may be planted by the waterside, where the roots may be wet, but the water should not cover the rhizomes.

Prepare the soil the same as for the Bearded Iris, eliminating the lime and using a pound each of bone meal and super-phosphate to 5 cubic feet of soil all the way to the top of the bed. No crowning of the bed is necessary.

Fill the first 11 inches (see text)





Press the earth firmly

The proper time for dividing and planting Beardless Iris is early September. When the centers of the clumps of these Irises die back, this is the signal for dividing and resetting. Divisions about 5 inches long are desirable. Plant about an inch deeper than the old clump stood, about 3 feet apart.

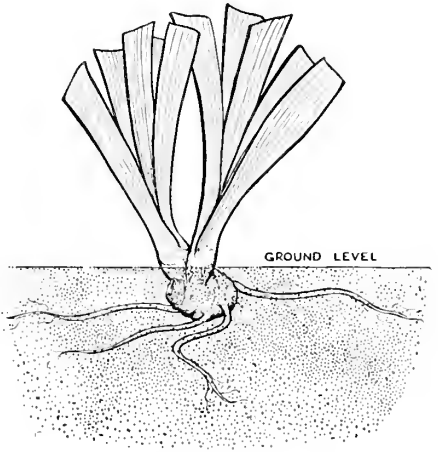
The bulbs of English, Dutch, and Spanish Irises are planted in the autumn, and should be covered by 3 inches of earth. They benefit by a winter mulch. Soil conditions that suit most garden plants

will do nicely. The bulbs may be taken up after the foliage has ripened, stored until autumn, then replanted.

Crested Iris

There are three types that are well worth while. *Iris cristata* and *I. cristata* var. *alba* are 6 inches high. They do well in shadows, and are indifferent as to lime. *Iris gracilipes*, another Crested Iris, may be handled in the same manner as *Iris cristata*, but the soil conditions should be as recommended for Beardless Iris.

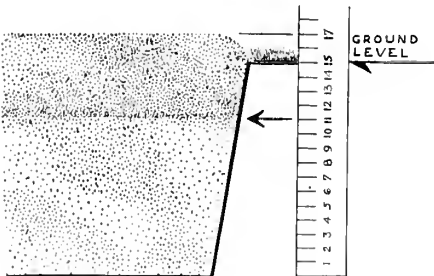
Irises do not do well if grown too long in one place in the garden. When dividing the plants, make it a rule to plant them in new ground as far as possible from the original position. The principles of crop rotation apply to many garden plants as well as to farm crops.



Plant the rhizome close to the surface

The directions given here may seem complicated to those who have seen Irises growing and blooming under varying conditions and in spite of neglect. However, for best results with the finest varieties, the best soil preparation and maintenance are needed.

Build up to about 2 inches above surrounding ground



TALL BEARDED IRIS

Some specific recommendations

F. W. Cassebeer

AS a result of intensive breeding by scores of fanciers throughout the country, so much improvement has been wrought in the Tall Bearded Iris that one would hardly recognize the modern varieties as descendants of the back-yard Iris of the past. In comparison, the modern varieties come in a much wider range of beautiful colors, average two or three times the size, and are immeasurably improved in form and substance.

Of course, these Irises must be seen to be appreciated; and it is often difficult to persuade those who are unacquainted with their beauty to discard their plants of obsolete Irises and make a fresh start with a few of these modern beauties.

How to Buy and Plant

The Iris beginner who is interested in making a start with worth-while varieties will obtain the catalogs of some reputable dealers, preferably Iris specialists. In them he will find lists of many hundreds of varieties ranging in price from 25¢ to \$25 a rhizome. The prudent beginner will probably want to make his selections from a group, in various colors, which averages about \$1 a rhizome. The highest-priced Irises represent the latest novelties, of which the supply is scarce, and are purchased mostly by fanciers. In most cases, these high-priced Irises do not represent any more real worth than the less expensive sorts; and so the beginner need not feel that he is compromising too greatly if he confines his purchases to Irises that are relatively inexpensive.

In purchasing Irises, it is well to bear in mind that a single rhizome will generally produce a well-formed clump in two years. If more immediate effect is de-

sired, a very satisfactory result can be obtained by using three to five rhizomes of a kind; and, of course, a much larger number will be needed if a mass planting is desired.

For best results, Irises should be planted in a sunny, well-drained location, in soil that is nearly neutral; every three or four years the clumps should be lifted, and the rhizomes divided and replanted in fresh ground.

Varieties

In preparing any list of recommended varieties for the gardening public, availability becomes one of the prime considerations. The ones described here are those readily obtainable from many dealers throughout the country; most of them are good, strong-growing varieties and can generally be counted on to give good performance.

Before discussing desirable Irises in various color groups, it is necessary to have some explanation of the terminology used in the catalogs.

Selfs—standards and falls the same color.
Bitones—falls the same color as standards, but of a deeper shade.

Bicolors—standards and falls of different colors.

Blends—one color with a light overlay or suffusion of another color, producing an harmonious effect.

Plicatas—light-colored flowers, edged, sanded, or dotted with a darker color.

Variegatas—bicolor, with yellowish standards and red or maroon falls.

Amoena—white or cream-colored standards and purple falls.

Neglectas—similar to Amoenas, but the standards are lavender or light blue.

For maximum garden effect, when viewed at a distance, the most desirable are the clear-colored *Selfs* or *Bitones*—

blues, yellows, whites, and purples. The unusual *Plicatas* and the intriguing *Blends* must be viewed at comparatively close range to be fully appreciated. The large number of *Iris*es now available in red, copper, and bronze tones usually fascinate the beginner; but, however attractive these individual plants may be, they cannot be used for garden effect.

White

White *Iris*es are becoming increasingly popular, possibly because of their stately effect and their use in setting off different plants of more vivid colors. One of the loveliest whites we know of is *Mount Washington*; it is warm in tone, and has beautifully formed flowers on a tall stalk. A similar variety, but one which is not so tall, is *Jake*. *Easter Morn* not only has flowers that look like white butterflies,

but it is distinguished by a delightful fragrance. *Gudrum* at first impresses by its size, and remains a favorite because of its free-blooming habit, in spite of the fact that it is rather coarse and has a short stalk. Among the blue-whites, *Mount Cloud* and *White City* are particularly desirable.

Blue and Purple

The light blue and lavender *Iris*es are still the most sought-after of all the colors. They give an effect of coolness and distance. They combine well with the colors of most other *Iris*es, particularly the pale yellows, whites, purples, and pink *Blends*. Here, *Great Lakes*, which has stood at the top of the popularity poll for the past several years, is a must. It has lovely, firm, flaring flowers of clear, light blue, so spaced on the stalk that it makes a particularly beautiful clump effect. In the same color, *Shining Waters* also has long been recognized as a leader. *Castalia*, though slightly shorter, is particularly floriferous and fine for mass effect. Another good one, *Anitra*, is slightly paler; and *Gloriole* is a very pale, frosty blue. In the deeper shades of blue, there are *Narain*, the late-flowering *Missouri*, and the very tall *Sierra Blue*. A worth-while dark blue is *Brunhilde*.

Among the large, bright purples are such varieties as *Indian Hills*, *Favori*, and *The Bishop*. The beautiful *Edna Hicks* is lighter in tone, and a little on the red side. For a deep, velvety purple, *Sable* is hard to beat; and the taller *Blue Peter* and bluer *Black Wings* are also desirable. Not so dark as the foregoing, and more of a *Bitone*, is *Nightfall*, one of the most consistently good performers in the garden. In *Amigo*, there is a considerable contrast between the light blue standards and the rich, dark falls. *Wabash*, easily the best of the so-called *Amoenas*, has clear white standards and bright purple falls, is fine and striking, and should be planted by itself, preferably in front of evergreens.

Iris Black Wings



Plicatas

Nearly everyone has a strong feeling about Plicatas—he is either very partial to them, or definitely antagonistic. However, beginners usually find them most appealing. Some of the best of them are Claribel—white ground edged blue-purple; Florentina, a light-colored variety dotted and sanded with blue; and Los Angeles, with most of the color concentrated in the middle of the flower. Tiffany is a large flower, with a ground color of creamy yellow heavily bordered with reddish purple. Balmung, on the other hand, is more lightly bordered and dotted with purple and brown. Tiffanja is a magnificent, tall, new variety, with light brown markings on cream-white ground, and a large white patch in the center of each of the falls.

Yellow and Red

Among the yellows, Golden Majesty is one of the best all-round varieties at a moderate price. It is a deep yellow with a hint of orange. Song of Gold is a softer, lighter yellow; and Fair Elaine is almost a cream, flushed with yellow. Golden Treasure is a striking flower of cream-white, with bright golden yellow center. On the tawny side there is Fortuna, which is reminiscent of some of the soft yellow tones found in Breeder Tulips. About midway between yellow and red in effect is the Variegata City of Lincoln, with strong yellow standards and strongly contrasting red-maroon falls. In general, yellows should be planted with light blues, pale pinks, and whites, and, for contrast, with purples.

There are many gradations of color in the red-toned Irises. Most of them do not mix well with Irises of other colors. The deep rose-reds can safely be used as a companion planting to white Irises and pale blue Irises; while those that have yellow in their make-up had best be planted alone, or with yellow Irises of a not too intense hue. They can also be

planted in front of the Beauty-bush (*Kolkwitzia amabilis*), whose delicate salmon-pink blossoms serve as a fine foil for the darker, more intense red of the Irises. Incidentally, the Beauty-bush is one of the few shrubs which are in flower at exactly the same time as the Tall Bearded Iris. Among the best of the rose-reds are Dauntless, The Red Douglas, and the two-toned Lighthouse. Christabel is a magnificent deep red that is neither purplish nor coppery; and Cheerio is a good, rich, two-toned red. Crimson Tide and Damerine are similar to the above, but are smaller in size. Louvois is distinctly a maroon; and Junaluska has a considerable amount of copper in its make-up. Sonny Boy is bronze, gold, and red; and Radiant is an intense terracotta color. Copper Rose is similar to Radiant, but has a certain amount of rose suffusion.

Orchid and Blends

In the past a great many varieties belonged to the orchid or lilac-pink group. Even here the modern varieties show a considerable amount of improvement—for example, Miss California, Angelus, Morocco Rose, and Pink Ruffles. Aubanel gives the pinkest effect in the sunlight.

Most of our so-called Blends are a combination of pink, yellow, apricot, and tan. Most famous of these is Prairie Sunset. Stardom is distinctly on the coppery side; and Remembrance is a pale, peachy pink. Buckskin is a fine yellowish tan; and Sunset Tan is a combination of brown, tan, and pink. Old Parchment is a fascinating Blend, opening as a dull lavender and fading to the color of parchment. The dark Grand Canyon has a mixture of purple, blue, tan, and brown; and Deep Velvet is a blue-purple, shaded brown in the center of the flower. Many of the above plants will be set off to particularly good advantage if used as companion plants for blue Irises.

DWARF AND INTERMEDIATE IRISES

Extend the Iris season. Oncocylus hybrids add variety

Robert Schreiner

Dwarf

LONG before the great pageant of June-flowering Irises unfolds, we have the tiny Dwarf Irises. Blooming with the first spring bulbs, the Scillas and Grape-hyacinths, these interesting little Irises come when we are eager for color. They are the first proofs that another Iris season is here. Fine for rock gardens and edgings, they are too often unknown to the average gardener. Dwarf Irises thrive with a minimum of care, requiring only a well-drained, sunny location, and resetting and thinning at intervals when the plant masses become too crowded. Being native to the alpine

regions of France, Italy, and the Balkan Peninsula, hardiness and vigor are their outstanding qualities. Within this group of plants there is great diversity of plant habit, stature, and color.

In American gardens one of the rarest of the Dwarfs is the species *Iris pumila*. The flowers of the true species are about 3 inches high, and a single rhizome often produces three or four buds. A 2-year plant gives a mass of color. This is the earliest-flowering Dwarf. Probably the most commonly known of the Dwarfs are the red-purple *Iris atrovioacea* and the sky-blue *Iris caerulea* (*azurca*). Both are hybrids between *Iris pumila* and the larger and later-flowering *Iris Chaemaciris*. Realizing that *Iris pumila* is more diminutive than either of these two hybrids, we can appreciate how fine an alpine subject it is.

The most widely known type of Dwarf Iris is the group of plants derived from *Iris Chamaciris*. This plant flowers with the Daffodils and up to the time of the Darwin Tulips. The flowering stems range in height from 5 to 12 inches, and the flowers have a wide range of colors. Some of the most highly satisfactory varieties in our experience are Marocain, a rich dark blue; Endymion, a smooth claret; Orange Queen, one of the more satisfactory yellows; and Sound Money and Golden Dream, two fine gold-yellows of great clarity. For the seeker of the unusual, the mauve-pink Rose Mist, and the medium blue Reflection add pleasant variety to the garden.

A significant new development in the creation of Dwarf Irises has been the hybrids of *Iris flavissima* (*arenaria*).

A dainty Dwarf, *Iris flavissima* (*arenaria*)



This dainty little native of the plains of Hungary has very small leaves, and yellow flowers that are pleasantly vanilla-scented. It needs a sandy soil. The species itself has flowers that last all too short a time, only a day or so; but the new hybrids derived by crossing it with the hybrids of *Iris Chamaciris* have given us the best-proportioned free-flowering Irises developed in the Dwarf Group in some time. Paul Cook of Bluffton, Indiana, has developed two fine new varieties: Tampa, with a decided reddish cast, and Keepsake, a flaring yellow. H. M. Hill of LaFontaine, Kansas, has also produced two fine varieties: Mist O'Rose, the pink-est Dwarf Iris we have seen, and petite Tiny Treasure, a rich flaring cream-yellow. We are delighted by these new hybrids, and confidently expect that a fine series of garden plants will be developed from this source. They have a charm and refinement that is peculiarly their own.

Intermediate

This group of hybrids fills in the blooming season between the Dwarf Iris and the Tall Bearded Iris. They vary in height from 15 to 28 inches, blossoming with the Tulips and the early Lilacs. They are heavily endowed with hybrid vigor. The plants are extremely hardy, and are the most floriferous of all the Irises in the Bearded Section. They are much overlooked; some extremely fine material is available, whose quality equals that of the finest new June-flowering hybrids. We have been particularly interested in the development of this Section of Iris; and two of our creations, Black Hawk (velvety blackish purple) and Ruby Glow (ruby-garnet), received the H.M. and A.M. awards from the American Iris Society. To give one an idea of the colors available in this fine set of hybrids, a selection would include Alaska, pure white; Golden Bow, bright yellow; Marine Wave, rich blue with white beard; Spring Glow, russet red; and Andalusian Blue, lightest blue.

Oncocyclus Hybrids

This Group of Irises embodies some interesting types that are crosses of Bearded Irises with species of the *Oncocyclus* Iris from the desert regions of Asia Minor. They need the hottest location in the garden, and a well-drained and gritty limed soil. Perhaps the most famous of these plants is the variety William Mohr. [See color plate.] This unusual plant, with its huge globular flowers netted and veined lilac on a silver-lavender background, has always brought exclamations of excitement from those who saw it. Derivatives of this plant have been hard to procure. But successful seedlings from it include Ormohr, a

An easy-to-grow *Oncocyclus* hybrid,
Iris Coquetry

Author photo





McFarland photo

The earliest-flowering Dwarf, *Iris pumila*—excellent for the rock garden

huge lavender-blue and one of the easiest to grow; and the famous variety Elmohr, a rich mulberry-purple of huge size and rounded form, the winner of the Dykes Medal in 1945, the highest award an Iris can receive. An intriguing new creation is the exotic Lady Mohr, reminding one of a green lady-slipper with the characteristic markings of the Oncocyclus Iris. Illustrated here is the variety Coquetry which perhaps best reproduces the markings of the Oncocyclus Iris in the easiest-to-grow garden hybrids. Note the most unusual veining and netting. C. G.

White of Redlands, California, has been the outstanding breeder experimenting with these unusual types. Some of his noteworthy creations are Present, rose marked with a striking blotch of color at the tip of the beard; Some Love, a cinnamon-pink etched on silver-white; and Susan of Hilly, precisely marked. These few words can give only a hint of the many diverse and altogether charming Irises that are not so well known as they deserve to be. Acquaintance with them makes us wonder how we ever overlooked these fine plants.

SIBERIAN IRIS

*For sixteen years one of the
features of the Iris Garden of
Cedarbrook Park, Plainfield,
New Jersey*

Harriette R. Halloway

THE dainty beardless flowers of the species, varieties, and hybrids of the Siberian Iris have a charm all their own. [See color plate.] They grow wild in Central Eurasia. Iris specialists may think that they cannot compete with the spectacular size and effect of the Tall Bearded Iris or of the late-blooming Japanese Iris; yet they fit into many garden situations not suited to these better-known kinds, and are more useful for cutting and for flower arrangements.

The white and bright blue and purple varieties are pleasing as accents when well placed in the flower garden. The tallest varieties are useful in the back of a mixed border. A mass of various shades in a large oval bed set in grass, backed by up-sloping lawn and shrubbery, looks like a blue pool. In swampy ground or on the border of a pond or stream they may be naturalized.

Culture

The plants will grow and bloom with conspicuous success if just a few fundamental principles are followed. Like most Beardless Irises, they need plenty of moisture during the growing season. In locations which do not provide this, the first and most important factor is deep and thorough preparation of the soil. In my own garden the strongest plants and the largest and best flowers have developed in areas which had been prepared for Dahlias by trenching the soil to a depth of 3 feet. Stones, roughage, and good garden soil were placed in the bottom

layer; well-rotted manure and good garden soil in the second layer; and ordinary soil was mixed with sifted leaf mold, bone meal, and wood ashes to complete the top layer.

Such preparation is most important where permanence is expected. Most gardeners will not dig to such a depth, and good results can be obtained by going down only 18 inches or 2 feet; but the deeper the soil, the better the opportunity for the long roots to go down and get moisture during dry spells. Under good conditions the plants will grow, increase, and flourish in the same position without being divided for a period of ten years or more. They do not need the frequent dividing and replanting in a new location which is so imperative with the Bearded Iris.

Siberian Irises may be divided and transplanted in the autumn, but the best time is the early spring while the newly rising shoots are 2 or 3 inches high. Unlike the Bearded Iris which can stand greater dryness, the tiny rhizomes of the Siberian Iris should go well under ground—about 2 inches. Do not plant in a too dry location.

Because these plants require so little after they are well planted, we are too likely to neglect them. In any dry spell, but especially in the spring, they should be watered. In the early spring, after the first year, fertilizer should be stirred in when the soil is cultivated. From the third year on they should be fertilized again after blooming. Wood ashes, bone meal, or a good general fertilizer may be used.

Siberian Irises do better in soil a little on the acid side. Give them leaf mold but never lime. As a health measure, the last thing in the fall after the foliage has nearly all turned brown, the plants should be cut to the ground and burned.



McFarland photo

Siberian Iris (*Iris sibirica*); a dense grower, excellent as an accent plant

Varieties

It is difficult to recommend varieties when the location and the amount of available space are not known. If a representative collection is being planned, then of course the original wild species, *Iris sibirica* and *Iris orientalis* and its white form Snow Queen, should be included. At the other end of the list are highly praised expensive new varieties. Most of these are hybrids between the two species, combining the height of *Iris sibirica* and the large flower of *Iris orientalis*. Representatives of these are Cool Spring, Eric the Red, Mountain Lake, Tropic Night, and Tycoon. In between are many beautiful and inexpensive varieties, all obtainable from many nurseries as well as from specialists. These include Blue Flame, Blue Ridge, Perry's Blue, Blue Wings, Emperor, Caesar, Caesars Brother, Gatineau, Llewellyn, Morning Magic, Nipigon, Summer Sky, Turquoise Cup, and White Dove.

Iris Garden

Most of these are among the varieties growing in the Iris Garden, Cedar Brook Park, Plainfield, New Jersey, where they have been seen and admired by thousands of visitors each year.

The organizations which shared in the establishment of this garden—The Union County Park Commission through Mr. Tracey, The American Iris Society through Dr. Wister, The Plainfield Garden Club, the Brooklyn Botanic Garden through Dr. Reed, and the New York Botanical Garden through Mrs. Peckham—have continued active interest, chiefly through frequent gifts of varieties. The originating, developing, and directing of this Garden were and are my great privilege.

Each year the Garden is used as a living catalog by many who want to observe ways of growing Irises and to choose new varieties to plant in their own gardens.

IRISES OF THE SOUTHERN UNITED STATES

The many different types, and something about their origin

George M. Reed

DURING the past twenty-five years great interest has been taken in the wild Irises of the southern States. The explorations of Dr. John K. Small and his associates resulted in a marked increase in our knowledge of the native plants. All together seventy-eight new species were described, most of which belong to the HEXAGONA IRIS GROUP. The great enthusiasm of those interested in garden plants has led to the organiza-

tion of Iris societies, whose members have collected wild plants and developed new varieties by hybridization.

Early Records of Iris Species

Previous to 1920 only nine species of *Iris* were listed for the southern States, and these had been known for more than a century. Two of our Blue Flags, *Iris versicolor* and *Iris virginica*, were recorded by Linnaeus in 1753. The former is our northeastern Larger Blue Flag, extending south into Virginia; the other is generally distributed in the southern States; and as variety *Shrevei*, extends northward through the Mississippi Valley into Ontario, Canada.

Three species of *Iris* belonging to the Hexagona Group have been described: the southern large blue *Iris hexagona* (named by Walter in 1788), the copper *Iris fulva* (named by Ker Gawler in 1812), and the leafy Blue Flag, *Iris brevicaulis* (named by Rafinesque in 1817). Until 1902 this last-named one had been confused with *Iris hexagona*; and it was first clearly distinguished by MacKenzie and Rush under the name of *Iris foliosa*.

Of the remaining four species, *Iris tripetala* was recorded by Walter in 1788, and is found growing in the low pine lands of the South Atlantic Plains. The other three, *Iris verna* (Linnaeus 1753), *Iris cristata* (Cronon 1789), and *Iris prismatica* (Pursh 1814), are found in the upland areas of Virginia, North Carolina, South Carolina, Georgia, Tennessee, West Virginia, Kentucky, and Missouri, as well as further north.

The Hexagona Group

The chief interest centers in this group of Irises, and nearly all of the species newly described by Dr. Small belong here. The main characteristic is that the ovary in the flower has six prominent ribs, which, in section, give a six-angled appearance. In the mature seed pods these ribs are less evident. Frequently the pods are large, 3 inches or more long and 2 inches in diameter. The seeds are large, and are provided with a thick, cork-like covering.

The rhizomes are usually long and branched, and give rise to a wide spreading clump. The flower stalks are usually a little longer than the leaves, and bear two flowers at the apex and one or more from leafy bracts lower down. The flowers vary in size, color, and poise. There is a distinct hairy crest on the central region at the base of the falls.

Growth Conditions

Under natural conditions the plants grow in moist situations. Growth is vigorous until after blooming time; then follows a period of more or less dor-

mancy while the seeds are maturing. In late summer or early fall growth activity is renewed, resulting in well-developed leaves before the winter season begins. Under the mild conditions of the South no harm occurs, but in the colder North extensive damage may result. In the North they may be grown successfully away from moisture which might freeze and cause injury to the rhizome. Best results are secured by planting them along the side of a brook or pool, in which the water level is lowered in winter. However, these Irises do very well in the garden border when supplied with a rich soil.

Hybridization of Southern Irises *

The description of so many new species, most of them narrowly limited in their distribution, aroused widespread interest. The question was raised whether they were actually new species or whether general and widespread hybridization had occurred, under natural conditions, between the copper-colored *Iris fulva* and the already known blue-flowered species. In fact, such crosses had been successfully made artificially.

Mr. W. R. Dykes, in 1907, pollinated *Iris fulva* with pollen from *Iris foliosa*; and from the seed he grew plants which first flowered in 1910, one being introduced under the name of *Iris fulvala*. In many characters it showed an intermediate resemblance to the two parents. In 1918 Mr. E. B. Williamson introduced the variety Dorothea K. Williamson, also obtained by using pollen from *Iris foliosa* on *Iris fulva*. [See color plate.] Mr. T. A. Washington of Nashville, Tennessee, collected the wild *Iris fulva* and *Iris foliosa* from many localities in the southern Mississippi River region. He made many crosses between the two and obtained forms varying greatly in flower color and other characters.

* For a fuller discussion of this topic, see *Brooklyn Botanic Garden Record*, Vol. 20, No. 4, 1931.



McFarland photo

Iris cristata—a dainty Dwarf, and a native American

In 1925, I self-pollinated Dorothea K. Williamson, and by 1928 obtained several seedlings in flower. Since Dorothea K. Williamson is a first-generation plant derived from *Iris fulva* and *Iris foliosa*, these seedlings belonged to the second hybrid generation. There was great variation among them, especially in the size,

shape, poise, and color of the flowers, as well as in other characters. The color varied in different tones of violet-purple and red-purple. One of the most striking was a seedling with yellow flowers of the general shape and poise of the *Iris fulva* grandparent. [See color plate.]

In the years since, many crosses have



A tall, vigorous-growing native species,
Iris giganteaerulea

been made between *Iris fulva*, and *Iris foliosa*, *Iris hexagona*, *Iris giganteaerulea*, and several of the recently described species. First- and second-generation plants, as well as back-crosses,* have been grown; and the plants obtained have covered a wide range of variation, especially evident in the flower characters. All the data support the conclusion that hybridization between a very few species has, in time, given origin to the wealth of types found in the southern habitats.

* A back-cross is a cross between a first-generation hybrid and one or the other of its parents.

Evidence from Field Studies

Mr. Percy Viosca, Jr. has extensively studied the problem of the southern Iris from the twofold standpoint of taxonomic relationship and ecological distribution in Louisiana. From the results of his investigations he concludes that there are only three species present: *Iris fulva*, *Iris foliosa*, and *Iris giganteaerulea*, the latter being the only one of the large number of recently described species that is recognized as such. All the plants of the great array are hybrids between *Iris fulva* and one or other of the blue-flowered species. In suitable areas where *Iris fulva* is found growing near one of the blue ones, hybridization occurs naturally, and from the crosses the great variety of types originates.

Garden Value

The enthusiasm of the southern gardeners is leading to the development of many superior varieties. They are well adapted to the South where the winter conditions are mild. Since the Tall Bearded, Siberian, and Japanese Irises need mild freezing weather, they may be replaced, in the South, by the native types which provide a wide range of color and plant variations.

In the North much greater use may be made of these native American plants. They fill in the gap between the Tall Bearded, Siberian, and Spurian, and the later-flowering Japanese varieties. *Iris foliosa* is low-growing, but produces an abundance of blue or violet flowers on short stalks spreading outward from the base of the leaves. *Iris giganteaerulea* is tall and vigorous-growing. *Iris hexagona* is the latest to bloom, coming along with the Japanese Iris varieties. Many hybrids are available and furnish a wide array of color variations: nearly pure reds, orange-reds, red- and violet-purples, and yellows.

Long ago these Irises were appreciated by a few explorers. Audubon found



McFarland photo

The common Larger Blue Flag of the northeastern United States (*Iris versicolor*)

"along the marshy banks Irises, some in sheathed bud, some in full flower, tiny wine-red Irises, a lake of giant blues in bright fresh color, others of rich salmon, of rose madder—there seemed no end to this fresh transparency of bloom."

Most of our Irises have been introduced

from foreign lands: the Bearded from Europe and western Asia, the Siberian-Oriental group from Europe and Japan, the Bulbous from Europe and North Africa, the Japanese from Japan. Certainly our native southern Irises may rival the other groups in their possibilities.

BULBOUS IRISES

Little known, but well worth while

Jan de Graaff

THE Irises that have true bulbs are probably among the least-known members of the large and heterogeneous genus; yet because of their brilliant coloring, their attractive form, and their ease of culture, they are appreciated

whenever grown. They are low in price, and they make excellent, long-lasting cut flowers. One may well wonder why these bulbous plants are not better known and more popular.

The answer to this question is not far to seek. The Bulbous Irises make ideal cut flowers. Hence they have always been greatly in demand by commercial growers; and the larger bulbs, those that

Dutch Irises—best known as cut flowers, though hardy out of doors

McFarland photo



give the nicest and sturdiest flowers, have been bought up each year for hothouse forcing. At last, however, the supply is equal to the demand of both professional and amateur growers; and there is now no reason why all gardeners should not try a few Irises in their gardens.

There are several species of Bulbous Iris. The most important for American gardeners are: *Iris tingitana*; and *Iris Xiphium* and *xiphioides*, both available in many varieties. Of much less importance are such species as *Iris filifolia*, *tuberosa*, *persica*, etc. Each major species has its own cultural requirements; but none of these requirements is beyond the resources of our gardeners, and all are easily met.

Iris reticulata, the earliest species, is considered in another article in this issue of PLANTS & GARDENS.

Iris tingitana

Iris tingitana and its hybrids are the next to flower out of doors. The best-known of these hybrids is Wedgewood, the ubiquitous light blue Iris of the florists. [See color plate.] None of the varieties derived from *Iris tingitana* is of value for garden purposes, since the foliage emerges so early that it usually is badly weathered during the winter and rather unsightly. Also the flowers bloom too early to escape weather damage.

Dutch and Spanish Irises

The Dutch Irises flower shortly after the *Iris tingitana* group. Together with the Spanish Iris, they belong to *Iris Xiphium*; the two are so closely related that the main difference between them is merely one of flowering dates. The Dutch Irises are the earlier ones. They have large, brilliantly colored flowers, ranging in color from pure white, through cream, to deepest golden-yellow. They also vary from lightest sky-blue to deepest purple, while several varieties

are of true lilac, violet, and bronze shades. The same colors are duplicated in the Spanish Iris; but since the Dutch grow better and are stronger, the Spanish have disappeared from the market. One exception is the brilliant golden-yellow variety, Golden Lion, which, besides being an extremely good grower, is ruffled and fragrant. This is one of those rare plants on which nature has bestowed all its bounties at one time. Golden Lion is tall and is an attractive cut flower. Hence today the supply is still rapidly absorbed by cut-flower growers; but when it once becomes more readily available, it should be in every garden. I have purposely refrained from listing varieties of Dutch and Spanish Irises. All those currently offered in the seed and bulb catalogs are good. The list is not subject to drastic changes, and the desired color is usually the determining factor in making up an order.

The cultural requirements of both the Dutch and Spanish Irises are good drainage, a rich garden loam, and some protection against the sharpest frosts, especially in the spring. Our experience indicates that these Irises are perfectly hardy anywhere in the United States, but that they cannot survive repeated freezing and thawing and the resulting excess of moisture around the roots.

English Irises

The latest of the Bulbous Irises to flower are *Iris xiphioides* and its varieties, commonly called the English Iris. Although they do not contain yellow, they are even more brilliantly colored than the Dutch or Spanish Irises. They need a great deal of moisture, as well as good drainage, during the summer months; their foliage is much broader than that of other Irises, and their bulbs are heavily coated and softer. They should not be allowed to dry out during the summer.

For something different, if you haven't already discovered them, plant Bulbous Irises!

RETICULATED IRIS

A Bulbous Iris for soils that bake dry in the summer

Katharine Maynadier Daland

THE name of this Group of Bulbous Irises comes from the Latin *reticulum*, "a little net." It refers to the network of fibers in the outer coat of the bulb.

The group includes various species native to the Caucasus, Persia, and adjacent regions. Of these *Iris Bakeriana*, *Danfordiae*, *Histrio*, *histrioides*, *Kolpakowskiana* and *Vartanii* are not in general commerce, nor are they often seen in this country.

The species *Iris reticulata* was first described by the botanist Bieberstein in 1808, and has been an important garden plant for more than a century. Bulbs can be purchased by the hundred at reasonable prices. The type usually sold has deep violet flowers with an orange median ridge, and is deliciously fragrant. Well-known varieties are: *Cantab*, pale blue; *Reticulata Hercules*, bronzy violet; and *Reticulata Krelagei*, reddish purple.

In the neighborhood of Philadelphia and New York these Irises bloom early in the spring, in protected spots some-

times as early as late February. Single flowers about 3 inches over all are borne on a short stem about 4 inches long. The leaves (which resemble those of garlic in appearance, and are therefore in danger of being mistakenly pulled up as weeds) grow taller, up to 9 inches or so, after blooming is over.

Iris reticulata should be planted in full sunlight, and will thrive in a soil that is well drained and becomes dry and baked in the summer.

My first three bulbs were planted in 1930, near Philadelphia, in a rather heavy clay soil that baked hard every summer. Here they prospered undisturbed for many years, and soon they covered several square feet with thick clusters of bloom. They also seeded freely, so that seedlings are available to extend the plantation or to try elsewhere.

Some of the bulbs of the original planting were moved to a lighter loam, more like a woodland soil. They have not done nearly so well, but others planted in a hard-baking soil near Princeton have grown and increased beautifully.

In our hot and dry summers the bulbs should be left in the ground and not lifted, as is the common practice in England and other damp climates.

McFarland photo



GARDEN USES OF IRIS

In sun or shade, in dry or wet soil

Gertrude M. Smith

THE many types of Iris fill a great variety of places in the garden. Some are useful in rock gardens, some in woodland plantings, others in moist situations. Probably they are most commonly used in borders of mixed perennials, where they can be used, according to size, for foreground, middle, or background.

In the Perennial Border

Bearded and Siberian Irises are the types best suited to the average perennial border. The Dwarf Bearded Irises bloom between the middle of April and the middle of May in the vicinity of New York, varying according to the season; and are effective for two to three weeks. Their low stature makes it natural to place them at the edge of the border or near it, where they look well in clumps of one color to a clump. These early comers are in bloom with the early Blue Phlox (*Phlox divaricata*) and Greek Valerian (*Polemonium reptans*). With the pale lavender-blue of these perennials, deep violet varieties such as Cyanea and Black Midget are very effective. Violet, blue, and yellow varieties look well with the intense yellow of the Basket-of-gold (*Alyssum saxatile*). They are in bloom with either early or May-flowering Tulips, varying according to the season. A very lovely Dwarf is Iris Glee, a soft yellow that grows a little higher than most of its sister Dwarfs. It is especially effective in front of the tall Tulips, softening the effect of too many straight stems.

After the early Dwarfs have come into bloom, the flowers of another group, the Intermediates, begin to unfurl. Long known in gardens, though perhaps not by

name, are the pearly-white fragrant *Iris germanica* var. *florentina*, and the coarse bicolor blue and purple *Iris germanica*. Less well known are *Iris Kochii* and Purple King, which are self-colored. Some of the modern Intermediates are superior in form and have a greater color range. They can be counted on in most seasons to bloom with the May-flowering Tulips. If belated, they will be in company with Columbines and Oriental Poppies. Bleeding-hearts and *Phlox divaricata*, perennials with especially long blooming periods, should be flowering with both the Dwarfs and the Intermediates.

The Table Irises are also in bloom at this time or a little later. These, characterized by small flowers and wiry stems, are very useful for small gardens where grander varieties are out of scale. Foremost among them are the dainty Pewee, Warbler, and Kinglet. The flowers are small, well placed on slender stems, and appear in abundance. A fine clump of any of these is an asset to any garden picture.

Coming to the Tall Bearded Irises, we have an embarrassment of riches; and it is from this group that gardeners will choose most varieties. Many are frightened by the knowledge that new introductions are priced from \$10 to \$30 a root. Yet the catalogs of specialists giving these top prices list also excellent varieties a few years older for 35 cents, 50 cents, or a dollar. In planning for garden effect, it is best to decide on the color wanted for a particular spot, and then to search a good catalog for likely candidates. The all-important heights are marked in the lists of specialists. Such an Iris as the 40-inch splendid blue Great Lakes may go toward the back of the border, while the varieties of more modest stature, such as velvety deep Black Wings and White Gudrun, must be toward the front.



McFarland photo

Irises and Peonies combined in a perennial border

It seems a pity to continue to grow some of the older Irises of dull color or poor branching habit simply because they have always been in the garden. This does not mean that all old Irises should be thrown out, but that it is well to evaluate the actual contributions they make to the garden picture.

Clumps of Irises look best in the border when some of their foliage as well as the stately blossoms can rise above the plants directly next to them, and each variety can make a distinct color impression by itself. The self-colored varieties give the

strongest effect at a distance. The blends, with their subtly intermingled shades of color, give much softer effects, which are best appreciated at close range.

A well-grown clump of Tall Bearded Iris continues to be effective in the garden when its bloom is finished; its stiff fans of foliage make a strong contrast with the foliage of such perennials as Columbines, Peonies, Fraxinella (*Dictamnus*), Shasta Daisies, and Coral-bells (*Hemerocallis*). For interest in foliage, it is best not to plant Bearded Iris directly next to Siberian Iris or Day-lilies (*Hemerocallis*).

An interesting type of Bearded Iris is that which gives a second season of bloom in the fall. Intermediate in size and time of bloom, the varieties of this group often produce fine flowers as late as November. In the Presby Memorial Iris Gardens in Montclair, New Jersey, there is a fine planting of them in full sun that produces moderate bloom in autumn. They bloom more reliably in milder climates. Gardeners who have room for novelties and delight in the unusual will enjoy trying one or two of these.

In Moist Places

The (beardless) Siberian Irises [see color plate] come into bloom just a little after the Tall Bearded. Some, such as *Caezars Brother* and the older *Emperor*, are valuable for their height, up to 4 feet; but most of them, ranging from 2½ to 3 feet, belong in the middle part of the border, where they bloom with the early Day-lilies and the first of the June Peonies. Siberian Irises do well in situations that are too damp for the Bearded Iris to thrive, although they will also grow well in any good garden soil. Because of their resemblance to our native Larger Blue Flag (*Iris versicolor*) of damp places, they seem especially suited to waterside plantings, where the decided colors of the modern varieties give a much stronger effect than *Iris versicolor*. If a native Iris is wanted for a damp location, the Slender Blue Flag (*Iris prismatica*), daintier than *Iris versicolor*, but similar to it, is a good choice.

Later in June the Yellow Flag (*Iris Pseudacorus*) comes into bloom, valuable for its sunny color and ability to thrive in actually wet situations. [See color plate.]

The Japanese Irises close the great Iris display in late June or early July. They are less dependable in the ordinary mixed border than the Bearded and Siberian Irises, no doubt suffering at times from lack of moisture. When they are in soil

that is moist through the spring and early summer, their richly colored giant blossoms come at a time when the great burst of perennial activity is over, and so are most valuable.

In Shade

There are two small Irises quite different from all these sun types, both Crested Irises. They are our native *Iris cristata* and the Japanese *Iris gracilipes*. Both of these thrive in conditions of light shade and a soil rich in humus or leaf mold. Their light lavender flowers, in the latter part of May, are charming for shaded rock gardens and woodland plantings. Both are harmed by the full blast of the summer sun that is so beneficial to the Bearded Iris.

Iris for colorful bloom beside garden steps

McFarland photo



THE IRIS BREEDER'S OBJECTIVES

With hints on attaining them

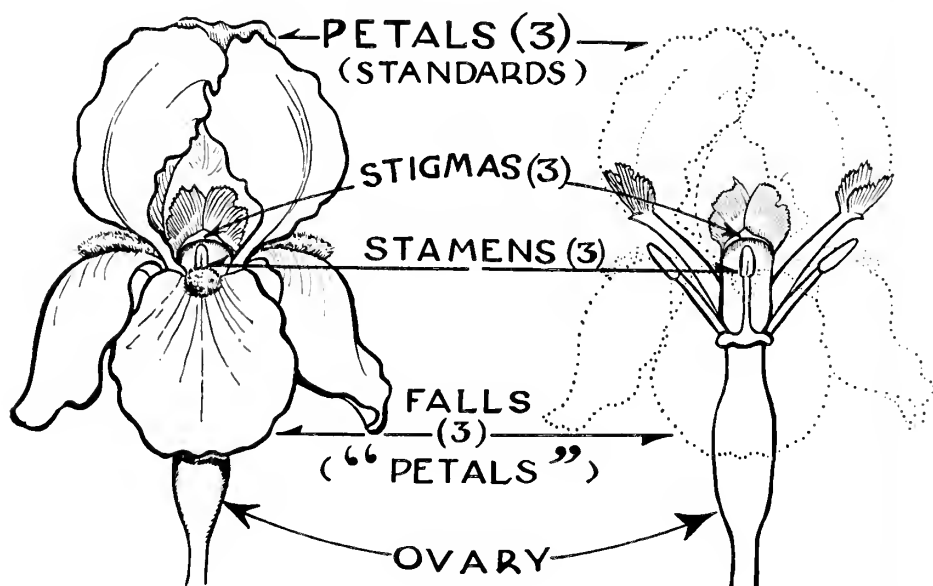
John Dolman, Jr.

THOSE who know the Bearded Iris only in the form of the old Blue Flag or "German" Iris, the white Florentina (*Florentina alba*), and the runty little brown and yellow *Honorabile* (*Honorabilis*), would be astounded at a modern collection of several hundred Tall Bearded hybrids. No other flower has made so spectacular an advance in size, form, and variety of color in so short a time.

Who Can Cross Irises

One reason for this is the fact that any intelligent Iris enthusiast, with a few good varieties to use as parents, can make crosses, raise seedlings, and run a gambler's chance of getting something interesting. Most of the other kinds of flowers in commerce are improved systematically by large-scale growing on huge seed farms, with armies of skilled workers to do the crossing, bagging, harvesting, and selecting. The Bearded Iris has been improved largely by amateur or semi-professional hobbyists, raising from 300 to 3,000 seedlings

The Iris flower as the plant breeder sees it



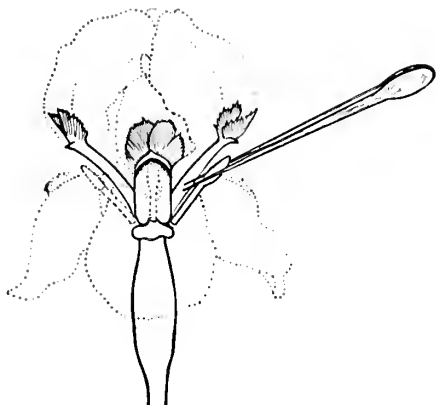
a year each, though on the average not more than one seedling in 3,000 is sufficiently different or superior to warrant introduction. The best contributions have been made by hybridizers who have given much time and study to the genetic principles involved, and to the selection of parents; yet a surprisingly large number of good varieties have come from small gardens.

How to Cross

The actual process of making a cross is very simple. The structure of the Bearded Iris flower is shown in the diagram; Beardless Irises vary considerably in the shape and relative sizes of the parts, but are structurally similar. For the pollen parent, select a flower that has been open just long enough for the anther to puff up and show the pollen. For the seed parent, select a flower that has been open just long enough for the stigmatic lip to ease away from the style arm (usually three or four hours). With a pair of tweezers pluck a stamen from the pollen parent, and rub the pollen on all three stigmas of the seed parent. As soon as the flower is pollinated, mark it with a tag and make a full record of the cross in a notebook.*

Care of Seedlings

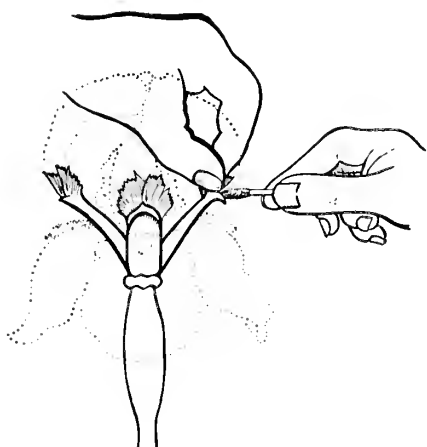
If the cross takes, the pod begins to swell in a week or so, and matures in sixty to eighty days. The seeds are harvested, dried, and planted in the fall; they germinate the following spring. Seedlings are best transplanted to the growing field when about 3 inches high. If they can be generously spaced in fresh ground, and given good cultivation and an occasional watering in dry weather, most of them will show bloom a year



Removal of stamens prior to cross-pollinating

after planting out, or two years after the cross. If the transplanting is delayed, or if soil and weather are not favorable, normal bloom will be delayed another year. A seedling that does not bloom three years from the cross with reasonably good cultivation is not likely to be worth saving.

Applying pollen to upper side of lip-like stigma



*For detailed instructions on hybridizing, including bagging and other precautions, see the article by Elizabeth Marcy, "How to hybridize plants," in *PLANTS & GARDENS*, Spring, 1947.

Choice of Parents

The most important problem in breeding is the choice of parents; and that, in turn, depends upon what qualities you wish to perpetuate. While hybridizers are still looking for new color breaks and novelties, the range of color in Bearded Irises is now very wide, and it has been achieved somewhat through the neglect of other qualities. The greatest need, at present, is the improvement of existing color strains through breeding for better form; better substance to withstand rain, wind, and sun; better proportion; better branching habit; more rapid and vigorous growth; greater resistance to Iris borers and Iris rot; and a longer season of bloom.

Size and height have been major objectives, but there is little point in a huge flower that is droopy, amorphous, and out of proportion to its stem; and there is little point in tall stems that flop over in the rain, wind, or hot sun. Strong stems that do not have to be staked are much more to be desired. For an exhibition stalk, low, wide, graceful branching is an element of beauty in itself; for garden effect, good branching means chiefly good placement of the flowers so that they do not crowd and deform one another. Good form is a matter of taste. Some people like globular flowers; most fanciers prefer flaring falls, though many do not like them too stiffly horizontal. Nearly all agree in admiring wide petals (especially wide falls), and also in preferring closed standards—domed, conical, or adpressed. Nearly all like some ruffling, and nearly all dislike messy or conspicuous markings.

Unfortunately, the desired qualities cannot always be achieved by selecting

parents that have them. Some good varieties are poor parents, transmitting their worst qualities rather than their best. Some are seed-sterile; others pollen-sterile. Some have persistent and unexplained incompatibilities, failing to cross with the ones you want them to cross with. Worst of all, some transmit the desired and undesired qualities with a genetic linkage that seems almost impossible to break.

For anyone who is going into Iris breeding seriously, the quarterly *Bulletins* of the American Iris Society are very helpful, as is the Iris Society Check List. Most helpful are the published parentages of the more recent introductions; these reveal the fact that certain varieties have proved to be exceptionally good parents, contributing significant qualities to their descendants or figuring in a high percentage of the more successful crosses. Among the best of these, old and new, may be mentioned: Dominion, Lent A. Williamson, W. R. Dykes, Far West, King Tut, Rameses, Jubilee, Dauntless, Easter Morn, Morocco Rose, Prairie Sunset, Sensation, Gloriole, Purissima, Evolution, Tiffany, Matula, Happy Days, Christabel, Jean Cayeux, Aubanel, Great Lakes, Snow Flurry, Sable, Mary Vernon, Melitza, Lake George, Katherine Fay, Miobelle, Spindrift, Overture, Cloud Castle, Katharine Larmon, Orange Glow, Golden Eagle, and Ola Kala.

Iris breeding is a fascinating hobby. It provides an opportunity for enjoyment in the adventure of producing new seedlings. Most of these will be no better than existing varieties, to be sure; yet any one of them might turn out to be an exceptional prize winner.

IRIS PESTS

How to recognize them; when and how to control them

J. Marion Shull

ON the whole, the Irises have only a few diseases and insect pests. Those that are most common can be dealt with efficiently when the gardener knows their life history and can recognize the earliest symptoms of their presence.

Borer

The adult of the Iris borer (*Macronoctua onusta*), a nocturnal moth, normally lays its eggs in October on debris about the base of the plants. The eggs lie there through the winter, and hatch in early spring just after plant growth begins. The first indications of the borers' presence are pin-point nibbles on the leaves with minute water-soaked halos around them. Later, the borer, still very small, eats its way into the leaf, the water-soaked area enlarging continuously. The leaves at the center of the fan emerge with ragged edges. Early recognition of the borer is important. Within the water-soaked areas the borer can be destroyed by firm pressure; or the fan may be cut below the point of attack and burned. The borer courses down the fan for four to seven weeks, growing larger all the while, and enters the rhizome for final fattening. Then it cuts through the underside of the rhizome, and goes into the ground for pupation; it changes to a bright brown spindle-shaped chrysalis an inch in length. This chrysalis (or pupa) is fragile and easily destroyed by rough handling of earth as in respading; hence the usefulness of resetting Irises every second year or so. The adults emerge from the pupae in October, mate, and lay eggs, thus completing the cycle. Since all

its life, except a few days in the spring and the brief mating and egg-laying time in the fall, is spent under cover, control of this pest by spraying is not practicable. DDT at the critical exposed periods might possibly be effective, but its use is still in the experimental stage. When Irises are reset in June, borers which are in the rhizomes at the time are easily cut out.

Rhizome Rot

This disease, caused by *Bacillus carotovorus*, produces a soft rot with foul odor. It is serious only under conditions

External symptoms of Iris borer injury. One leaf cut to show a young borer inside

Author photo





Author photo

Rhizome cut to show nearly full-grown borer

of undue moisture, resulting from poor drainage, prolonged rain, winter smothering under ice, or the presence of a mulch or other moisture-holding material like lime. Sanitation is the only practicable remedy. Good drainage (both surface and subterranean) is essential. Rot should be removed and destroyed. One can sometimes save part of a valuable plant by removing the rotted portion, treating the wound on the sound part with mercuric chloride (1 to 1,000), and re-planting in clean soil. The Iris borer may contribute to the spread of this infection, either by carrying the germ, or by creating the overmoist condition favorable to the growth of the *Bacillus*. This disease is caused by one of the same group of lowly organisms that are responsible for so many human diseases.

Mustard-seed Fungus

This fungus (*Sclerotium Delphinii*) appears as a mass of fine threads spread through the soil adjacent to the plant or over the rhizome itself. This mass of

threads (or mycelium) sends up minute fruiting bodies (or sclerotia) the size of mustard seeds—hence the popular name. It thrives in overmoist conditions, and so it also is mostly a problem of sanitation. It grows primarily on dead material such as old Iris leaves lying on moist ground. Where dead leaves lie in contact with live Iris plants or remain attached at their bases, the fungus readily passes over to active parasitism and rots the live leaf bases from the outside; it may destroy the growing tip if the disease is not found and the plant treated. All rot and dead leaves should be removed, and the rhizome exposed to air and sunshine. Dusting with powdered sulphur is helpful; and thorough soaking of the ground around the plant with mercuric chloride (1 to 1,000) will destroy the white threads of the fungus. The plants must be kept free of moisture-holding mulch or debris of any kind.

Leaf Spot

Iris leaf spot, caused by one of two fungi (either *Heterosporium gracile* or *Puccinia Iridis*), is in most gardens more unsightly than really harmful. Some varieties are nearly immune, while others suffer considerably. The tips of the leaves die and turn brown. The disease may be kept in check by early cutting off and burning of affected tips. Spray plants with Bordeaux (4-4-50); or use dusting Bordeaux, available at hardware or plant stores.

While the Iris borer is the commonest problem, the rhizome rot can become most deadly, in humid seasons especially. But watchfulness on the part of the gardener will save him from disappointing losses.



WITHIN THE BROOKLYN BOTANIC GARDEN

BOTANIC GARDEN WEEK

APPROXIMATELY seven and a half million people live within a 5-cent fare of the Brooklyn Botanic Garden. Untold numbers of other people, visitors to New York City and others who live near the metropolitan area, are within easy reach of the Garden. With

this in mind, the Trustees have set aside a week this spring for special horticultural and other activities at the Garden.

May 1 to 9, Cherry Blossom time at the Garden, has been designated as Botanic Garden week in Brooklyn.

MARY STORY CARPENTER MEMORIAL FUND

IN 1946 friends of Mary Story Carpenter established a fund so that beautifully illustrated books might be bought for the Botanic Garden Library. Appropriately, the bookplate utilizes a woodcut made by Mary Story Carpenter for her personal greeting card at Christmas time. This depicts a plant of the Christmas-rose in full bloom. In line with the artist's interests, the fund has been used for the purchase of illustrated books, as well as horticultural and botanical works written by women. Among the items secured are the following:

"Wild Violets of North America," by Viola Brainerd Baird, with color illustrations by F. Schuyler Mathews. Edition of 1,000 copies.

"Poisonous Plants," by William Dallimore. The illustrations are original woodcuts by the English wood engraver John Nash. Edition of 350 copies.

"Illustrations of North American Pitcher-plants," by Mary Vaux Walcott. A portfolio with 15 colored plates.

"A Study of the Genus *Paeonia*," by F. C. Stern, with fifteen illustrations in colour by Lilian Snelling.

"Camellias in America," by H. Harold Hume. Modern color plates.

"Flowers of the Engadine Drawn from Nature," by Evelyn D. Heathcote. 224

hand-colored plates of flowers of the Alps.

Brooklyn Botanic Garden Library



In Memory of Mary Story Carpenter

As appropriate books are published, and as the older worth-while books are offered for sale, we look forward to adding to this memorial.



GARDEN MEMBERS FIND COURSES ATTRACTIVE

A TWO-DAY course in Christmas Decorations was offered to Members of the Garden December 18 and 19, and received instant and overwhelming approval; participants urged that it be made an annual event. Three sections were filled to capacity—morning, afternoon, and evening.

Large registrations were a marked feature of both autumn and winter gardening classes. In response to many requests, the laboratory course in Flower Arrangement for Beginners was repeated in the winter term. Landscape Gardening for Amateurs, in which a landscape architect collaborated with members of the gardening staff, drew students from near-by States as well as New York City. Two greenhouse courses, House Plants and Window Gardens, and Horticulture for Amateurs, began in January and February. With the unique greenhouse facilities of the Garden, it was possible for all the students to raise plants with which to start their own outdoor gardens at home.

While the temperature hovered between freezing and zero, one group of students took a botanical tour of the world—never going farther than the greenhouses. This course, *Around the World with Plants*, was a series of five lectures explaining what a visitor should look for in the conservatories.

Two courses planned especially for teachers, Gardening and Horticulture, and Nature Science, were given during both terms. An important part of each course was the practical work out of doors and in the greenhouses.

Scheduled to begin in April and May are the following three courses:

Planning and Planting the Home Grounds—morning and evening sections.

Advanced Flower Arrangement (for students who have completed either the fall or the winter course)—morning and evening sections.

Native Wild Flowers and Ferns—an early evening class only.

BROOKLYN BOTANIC GARDEN

OF

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TO VISITORS

To reach the Garden:

By Subway: from Manhattan, twenty-five to thirty minutes' ride from Times Square or Grand Central: **I.R.T., West Side** (7th Avenue or Broadway-7th Avenue line), downtown express marked "New Lots Avenue" or Flatbush Avenue," to Eastern Parkway-Brooklyn Museum Station; **I.R.T., East Side** (Lexington Avenue line), downtown express marked "New Lots Avenue" or "Utica Avenue" or "Atlantic Avenue," to Nevins Street, step across platform and change to 7th Avenue or Broadway-7th Avenue train, ride to Eastern Parkway-Brooklyn Museum Station; **B.M.T.** Brighton Beach train to Prospect Park Station.

By Automobile: from points on Long Island take Eastern Parkway westward, and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway: follow the Parkway to Washington Avenue, then turn right.

PLANTS & GARDENS

Summer, 1948

Herbs for the Home Garden

—

Plants of the Northwest

—

Development of a Small Place

—

Softwood Cuttings

—

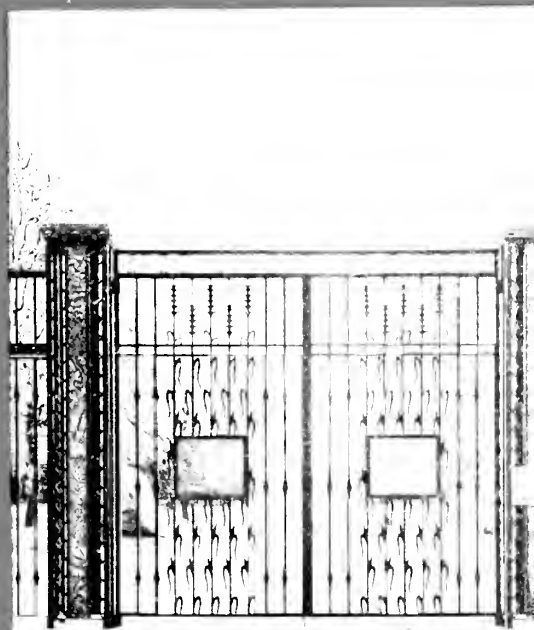
Summer Pruning

—

New Kinds of Plants by
Chemical Treatment

—

Bulbs and Other Plants
for Summer Bloom



AMONG THE CONTRIBUTORS TO THIS ISSUE

FRANK BAILEY, an amateur horticulturist whose show place on Long Island is an arboretum in its own right.

AVIS CAMPBELL, a graduate of The Lowthorpe School, and a landscape architect of Montclair, New Jersey.

ANNA LAMB FELTON (MRS. PAUL), a graduate of the Pennsylvania School of Horticulture for Women, formerly worked at the Scott Foundation at Swarthmore, and now lives on the west coast.

GEORGE GILLIES, Superintendent of the Marshall Field estate at Huntington, Long Island, and active member of the National Association of Gardeners.

A. E. KUNDERD of Goshen, Indiana, now over 80, was for many years the leading grower of *Gladiolus* in America.

MARGARET LANCASTER studied horticulture at Cornell University, and has charge of landscape planning and plant location at the Morris Arboretum.

ELIZABETH LAWRENCE, a landscape architect of Raleigh, North Carolina, has a special interest in tender bulbs.

CONRAD B. LINK, formerly Horticulturist at the Brooklyn Botanic Garden, now Professor of Floriculture at the University of Maryland.

CARLTON E. LOWE of Chagrin Falls, Ohio, a florist and a specialist in Tuberous-rooted Begonias.

REX. D. PEARCE of Moorestown, New Jersey, grows rare plants and deals in their seeds.

LOUISE POTTER, a member of the staff of Vassar College, has recently spent several months in Alaska.

GEORGE M. REED, for many years Pathologist of the Brooklyn Botanic Garden, conducted special investigations on Japanese Irises and visited Japan to study them.

HESTER M. RUSK, a member of the staff of the Brooklyn Botanic Garden.

JOAN SELTZER of Rose Valley, Pennsylvania, a student of landscape architecture at Pennsylvania State College.

GERTRUDE M. SMITH, a garden consultant of Montclair, New Jersey.

BETTY F. THOMSON, assistant professor of botany at Connecticut College.

JOHN TONKIN, Head Gardener of the Morris Arboretum of the University of Pennsylvania, received his early training in Cornwall, England.

ANNE E. WEBB, Executive Secretary of the Berkshire Garden Center, Stockbridge, Massachusetts.



Euonymus Fortunei var. *vegetus*

NEW SERIES

Summer, 1948

VOL. 4—No. 2

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JOHN C. WISTER, *Editor*

GERTRUDE M. SMITH, *Assistant to Dr. Wister*

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The editors were assisted in the preparation of this issue by Conrad B. Link.

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View of Brooklyn Botanic Garden Rose Garden from the pergola

Except where otherwise credited, photographs by Louis Buhle

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Summer 1948

TO FRIENDS OF PLANTS & GARDENS:

Editor Wister and I were among the out-of-town guests at the dinner honoring Dr. Liberty Hyde Bailey on his ninetieth birthday anniversary. A brief account of the unique gathering appears in this number of PLANTS & GARDENS. All of those present will long remember every part of the program, particularly Dr. Bailey's portrayal of events of his boyhood and later life. Dr. Bailey and his daughter, Miss Ethel Zoe Bailey, are now reading proof on a book soon to come from the press — while another is well on its way to completion. We at the Garden salute Dr. Bailey as he goes on adding to the riches of American Horticulture.

NOW ABOUT THIS ISSUE — If you live in a region in which winter temperatures are not far below those of Long Island, read the short article by Mr. Frank Bailey on the Hardy Silk-tree. Then write a letter or postcard to the Garden asking for the seeds which Mr. and Mrs. Bailey have collected and so kindly made available to PLANTS & GARDENS readers. The seeds are yours for the asking, and we hope the Silk-tree will thrive for you as it has done for the Baileys and for us here at the Garden.

Every one of the articles in this issue is timely for summer gardening and for information about plants:

On plant materials — numerous authors discuss summer-flowering bulbs and other plants for summer gardens. And for what you may not know about bulbs and their confreres, read "These Things called Bulbs."

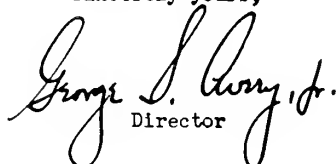
For the geographical touch — read "Flowers in Alaska" (both wild and tame!) and "Northwestern Trees and Shrubs."

For horticultural practices — round out your information from the articles on summer cuttings, summer pruning, and lifting and dividing narcissus bulbs.

And for the newer practices in experimental horticulture, don't miss "New Kinds of Plants by Chemical Treatment" and the article bringing you up to date on selective weed killers.

Good wishes for a wonderful summer out of doors.

Sincerely yours,


Director

FLOWERS IN ALASKA

Many of them familiar in other parts of the United States

Louise Potter

ALASKA is a land of ice and snow, or of flowers and ferns, depending upon when one looks at it. Much has been written of the enormous vegetables raised in Alaska; but the delphinium, foxglove, lupine, and sweet peas can match any of the vegetable stories; they are truly glorious.

Wild Flowers

There are many Alaskas of various altitudes and climates. When one realizes that from east to west Alaska measures the distance from Savannah to San Diego, the variety of its wild flowers is not surprising.

At Point Barrow (the farthest north one can go in Alaska), at Beechy Point, Point Hope, and Kotzebue (all places that call up arctic pictures), there are

delightful little arctic poppies (pale pink and apricot), forget-me-nots, Mertensia, "deer-cabbage" (*Nephrophyllidium*), and valerians. It is no wonder that the forget-me-not was chosen as the territorial flower. At Nome, still too far north and too much exposed to arctic winds to allow any tree to grow, one finds aconites, yellow violets, and lavender primulas; and in the acres of marsh land the blue iris. On higher land, back from the sea, grows the "tundra-rose," a yellow cinquefoil (*Potentilla fruticosa*). Near Eagle and Circle (upper Yukon) where lowest temperatures on this continent are often reported, the mountains are blanketed in June with the colors of *Anemone globosa* (pink and blue) and *Anemone narcissiflora* (white).

In the arctic meadows of the high coastal mountains one finds the lupine, bellflowers (*Campanula*), gentians, and anemones.

On the wide floor (alluvial soil) of the Tanana Valley around Fairbanks, the hills show acres of purple "wild crocuses" (*Anemone patens*) in spring as soon as the snow goes. These are followed by the wild bleeding-hearts, blue iris, and lady-slippers. In the summer come delphinium, lupine, wild rose, red columbine, valerians, and Senecio (a yellow daisy-like flower). Along the roads near Palmer, in the Matanuska Valley, and near Fairbanks, one sees such old familiar flowering weeds as yarrow, fireweed, and ox-eye daisy.

Ferns, in general, grow chiefly in the damper and warmer southeastern coastal areas of Alaska—the Panhandle. We find such familiar ones as maidenhair, rock brake, rock fern, dagger fern, holly fern, and woodsia. Here, too, is the home of the "squaw-lily" (*Fritillaria camschatcensis*), the skunk-cabbage, the cowslip, and some small orchids. "Fairly

Cool summers,
extreme winters

Mild summers,
extreme winters



slippers" (*Calypso*) are found on a few of the islands. Army men who spent a summer in the Aleutians will recall the dusty miller, purple aster, creeping dogwood, club-mosses, and saxifrages; and in certain parts of Kodiak, the lady-slipper.

Certain wild flowers can be said to be almost universal in the Territory. These are bluebells, gentians, anemones, wild geranium, creeping dogwoods, forget-me-nots (except in the Panhandle), and rock-cresses; and, where there is a spot of dampness, the white plumes of the "Alaska-cotton," or cotton-grass (*Eriophorum*).

Cultivated Flowers

Of the cultivated flowers probably foxglove, delphinium, and dahlia are the most striking, though sweet peas grow up to the roof of the Fairbanks wanigan. Even as far north as Fairbanks, lily-of-the-valley, bleeding-heart, day-lily, and peony winter easily. While the growing season in Alaska is short in weeks, it is long in hours of daylight. I have seen, in gardens in Fairbanks, in Palmer,

and in Skagway, practically every annual of which I have ever known the name. The garden flowers in the coastal towns of Alaska are the same as those in Vancouver or Seattle.

When one speaks of flowers in Alaska, one cannot pass by the house plant, so greatly treasured through the arctic winters. The gift most desired from "outside" by an acquaintance in Fairbanks was a gloxinia bulb! In a desolate place like Nome, it would be difficult to estimate the influence on human morale of a pot of red geraniums in the window.

References

The first extensive collection and classification of Alaskan flora was the work of J. P. Anderson of Juneau. He lists some 449 species in the first section of his work, and estimates that perhaps only half have been covered. "Alaska Wild Flowers," by Ada White Sharples, contains many excellent photographs and descriptions, and would make a fine traveling companion in Alaska for anyone interested in flowers.

"Wild Crocus" (*Anemone patens*)

Photo courtesy of the author



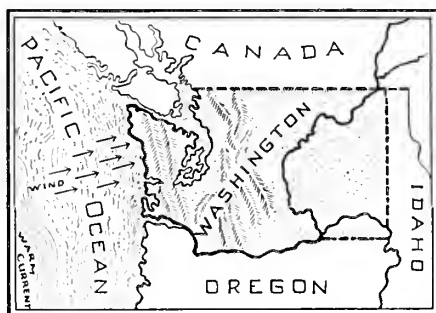
NORTHWESTERN TREES AND SHRUBS

Compared with their close relatives of the Northeast

Anna Lamb Felton

A COMPARISON of the native trees and shrubs of western Washington with those of the northeastern States affords an unusually interesting study. The woody plants on the western side of the Cascade Mountains have many east-coast relatives. Here are many of the same genera, Hemlock, Maple, Willow, Poplar, and many others; yet few of the same species. Some of the few species found in both the East and the West are the Common Juniper (*Juniperus communis*), a few Willows, the Quaking Aspen (*Populus tremuloides*), and the Canoe or Paper Birch (*Betula papyrifera*). In the last two, the western forms are classed as varieties of their eastern prototypes.

The western topography, with its high mountains rising abruptly from old river valleys and flood plains, accounts for the distinctive manner in which western plants are distributed. Elevations range from sea level to five and ten thousand feet, and plant associations are located accordingly. The mild climate of the valleys supports an almost entirely different array of plants from that found in the severely cold "high country." The high coastal range (the Cascade Mountains in Washington and Oregon) is a rugged barrier which separates the mild, humid coastal area, tempered by the Japanese current, from the much colder and drier east side. Accordingly, very different plants are found on the east side from those on the west. The eastern landscape is arid in varying degree;



Map showing how topography, wind, and water currents affect the climate of Washington

where trees exist, the most typical ones are Western Yellow Pine (*Pinus ponderosa*) and Quaking Aspen.

Evergreen Trees

An Easterner's first impression of the humid west side is the abundance and richness of all vegetation, and the preponderance of evergreens. Hemlock, Western Red Cedar, Douglas-fir, and the true Firs (*Abies*) create a rich dark background for the multitude of lesser plants.

The Douglas-fir (*Pseudotsuga taxifolia*) is notable for its tremendous size, being second only to the Giant Sequoias. Heights of 200 feet and diameters of 8 feet are not uncommon where virgin forests still exist. Douglas-fir and Western Hemlock (*Tsuga heterophylla*) are the two most abundant cone-bearers of the Pacific Northwest. Many a mountain slope is virtually covered by these two magnificent trees. The Western Hemlock is much like the eastern (*Tsuga canadensis*), except for its far greater stature.





Mountain Hemlock (*Tsuga Mertensiana*), in a subalpine location, near Mt. Adams, Washington

The "Western Red Cedar," or Giant Arbor-vitae (*Thuja plicata*), is a particularly beautiful and distinctive tree. It is very different in appearance from the eastern Arbor-vitae (American Arbor-vitae, *Thuja occidentalis*), being many times larger, and more open and branching. The gracefully sweeping, rich green branches may reach 200 feet, and the reddish fluted trunks of old specimens may measure 10 feet or more in diameter.

The Mountain Hemlock (*Tsuga Mertensiana*) and the Alpine Fir (*Abies lasiocarpa*) are the sentries of the mountaintops. Their dwarfed, wind-blown forms bear little resemblance to their erect and stately relatives of lower elevations. In very exposed places either of these species may grow like a low spread-

ing shrub. The slim, spear-like crown of the Alpine Fir is its most conspicuous feature. Its lowest branches usually sweep the ground, and may spread out for some distance. The Mountain Hemlock is distinguished by its handsome foliage, very dense and rich dark green.

Deciduous Trees

The more abundant evergreens of western Washington dominate the deciduous trees, which are limited in variety as well as in actual numbers. But without the lightening effect of Poplar, Willow, Maple, Alder, and many lovely shrubs, the landscape would be dark and monotonous.

The most plentiful deciduous tree west of the Cascades is the Red Alder (*Alnus rubra*). It is a tree of much greater stature than the shrubby eastern species: it may reach 125 feet. Pure stands of Alder are a typical feature of the landscape, and abound in river valleys and in areas once occupied by cone-bearing trees. The numerous red buds lend a rosy hue to the crowns in winter, making a strong contrast with the blue-green background of cone-bearing trees.

The largest deciduous tree of the Northwest is the "Black Cottonwood," or Western Balsam Poplar (*Populus trichocarpa*). Known to reach a height of 225 feet and a diameter of 8 feet, it is the largest of American Poplars. This tall, rather narrow tree is a familiar feature of the river valleys and bars, where it dominates the Willows and Red Alders.

The "Bigleaf Maple," or Oregon Maple (*Acer macrophyllum*), is something like an overgrown Norway Maple, with an even heavier canopy. The leaves may measure 14 inches across. A conspicuous feature in winter is the rich green moss which clings to the branches of Maples and most other deciduous trees of this rain-soaked area. The "Bigleaf Maple" is seen in mixture with other hardwoods and cone-bearers, or

singly along roads and around farms. It is one of the two large shade trees with spreading branches of the far Northwest; the other being the Oregon Ash (*Fraxinus oregana*), a handsome tree much like the White Ash (*Fraxinus americana*) of the eastern United States.

Very plentiful and attractive is the shrubby Vine Maple (*Acer circinatum*). The only provider of really brilliant fall color, its patches of lively orange and red are seen along rivers, lakes, and roads, and high on mountain slopes. It is an excellent ornamental shrub or small tree, the leaves being small and graceful, and the winter twigs delicate and colorfully tinged orange or red.

The aristocrat of Northwestern deciduous trees is the Pacific Dogwood (*Cornus Nuttallii*). Though a larger tree than the eastern Flowering Dogwood (*Cornus florida*), it closely resembles the latter in most respects. The graceful form, delicate twigs, and large flower buds of the two seem identical, as do the foliage, fruit, and crimson fall color. But in blossom they can be readily separated; the creamy flower bracts of the Pacific Dogwood usually number five or six instead of four; they lack the notch of the eastern kind, and they are almost twice as large. The Pacific Dogwood also has the pleasant habit of blooming again in October. Unfortunately this beautiful tree is reported not to thrive in the East. In western Washington it is fairly plentiful in open woods.

Evergreen Shrubs

There is a rich variety of native shrubs in western Washington, among which the broad-leaved evergreens are well represented. Very abundant is Salal (*Gaultheria Shallon*), in the Heath Family, an attractive creeping ground cover with leathery, oval leaves 2 or 3 inches long. In shady, moist places Salal is rather rangy in habit, becoming 3 to 6 feet tall; but where it has drier soil and

a considerable amount of sun, it is dwarfed. The leaves may turn a dark red in fall and winter. It is a good filler for informal areas.

Arctostaphylos Uva-ursi (known in the West as Kimmikinnik, but in the East as Bearberry) is another member of the Heath Family, and a handsome ground cover. It may be seen in its native haunt covering a dry bank; and it is useful and effective when planted in such a spot. Its dense prostrate growth and small shiny leaves are excellent, while its small pink flowers and reds fruits add to its value.

Abundant on the mountains of western Washington is the beautiful "Mountain Oregon-grape" (*Mahonia nervosa*). This is a dwarf relative of the better-known Holly Mahonia (*Mahonia Aquifolium*),

"Black Cottonwood," or Western Balsam Poplar (*Populus trichocarpa*), in a National Forest



which is found in the coastal areas. In its native habitat, the half-shady wooded slopes, the Oregon-grape makes an unusually handsome ground cover. The plant averages 12 to 15 inches in height, and has glossy spine-edged leaflets which may turn red in the fall.

An attractive member of the Staff-tree Family is the "Oregon Boxwood" (*Pachistima Myrsinites*). This dwarf shrub is unlike *Pachistima Canbyi*, a native of the Virginias, in that its branches are stiffly upright. The plant averages 2 feet in height, and is usually found in a well-drained, semi-shaded spot. An interesting characteristic of the "Oregon Boxwood" is the variation in leaf shape that is noticeable in a group of seedlings: leaves varying from a slender 1-inch length to an almost round half-inch.

Finally, among the woodland ground-cover type of plants, the beautiful Huckleberries and Blueberries must be mentioned. There are ten kinds listed for the Pacific Northwest, varying in height from 6 inches to 6 feet, and in locale from the coastal swamps to the alpine meadows. Deciduous or evergreen, blue- or red-berried, they are an interesting, handsome, and toothsome group.

"Bigleaf Maple," or Oregon Maple
(*Acer macrophyllum*)

Oliver V. Matthews photo



The most sought-after Blueberry for pies and jam is *Vaccinium deliciosum*, with large berries on dwarf plants. Unfortunately, this species is found only at high elevations; but many pie enthusiasts take the long tramp or pack trip to the mountain meadows for these plump, blue fruits. The reddish-orange foliage of *Vaccinium deliciosum* glows on many mountaintops in the autumn.

Deciduous Shrubs

Among the deciduous flowering shrubs the first to blossom is the "Red-flowering Currant" (*Ribes sanguineum*). The small bell-shaped rose-pink blossoms are in long drooping clusters, and appear in March, while the leaves are still tiny. In its native haunt in the woods it is rather straggling in habit; but it is an excellent ornamental shrub, responding well to cultivation and proper pruning.

The Rock-spirea (*Holodiscus discolor*), known locally as "Ocean Spray," is abundant along roads and open copses. It is a shapely shrub, usually about 5 feet tall, and provides profuse creamy blossoms in June. The flowers are tiny; but the large, slightly drooping branched clusters are very showy and decorative. *Holodiscus* is native only in western North America; its closest eastern relative is *Spiraea*.

Another beautiful native shrub is the "Red Elderberry" (*Sambucus callicarpa*). A large shrub with arching branches, 10 or 12 feet high, it has small creamy flowers in April, followed by handsome bright red fruits in early summer. The flat, brilliant-berried clusters, measuring 4 or 5 inches across, are a conspicuous feature of the country roadsides of western Washington.

Whether walking in the exquisite alpine meadows of the high mountains, or in the lush dense forests of the valleys, the eastern naturalist visiting the Pacific Northwest will feel that he is among familiar plant friends.

HERBS FOR THE HOME GARDEN

Long-cherished plants that still capture our affection

Anne E. Webb

WE frequently hear the question: "What is an herb?" The Herb Society of America defines an herb as "any plant that may be used for pleasure, fragrance, or physic." Different parts of herb plants are used: the leaves of Sage and Rosemary, buds and flowers of Saffron and Chamomile, basal stalks of Fennel, the seed of Coriander and Dill, and the roots of Horse-radish and Jerusalem Artichoke.

Herbs are not a fad. They have been cherished and used for centuries. It is interesting to search through some of the old herbals and learn what our forefathers used in place of a drugstore aspirin, or for hand lotion or moth flakes. The ingredients were found in the garden, whether it was an elaborate castle garden, a simple cottage garden, or the monastery gardens where the monks grew medicinal and cooking herbs and carefully recorded facts relative to their culture and uses. Rue was believed, in olden times, to grow best if plants were stolen, and to thrive only on a place where the mistress was master. The slowness of Parsley seed to germinate was explained by the old belief that the seed must return to the devil nine times.

We often hear people say that they wish to grow herbs but do not know how; or that they grow herbs, but (with the exception of Chives) dare not use them. Many books are available from which the novice may learn. State colleges and extension services, as well as the United States Department of Agriculture, distribute leaflets on herb culture. A bi-monthly magazine, now in its second year, supplies information for herb fanciers.

Propagation and Requirements

In olden times no distinction was made between growing herbs and growing vegetables; it is no more difficult to plant and care for an herb garden (with the exception of the "knot" garden, which may require much maintenance) than any other type of garden. Herbs are easily grown; their needs are few; and for the most part they thrive in full sun, in ordinary well-drained soil. Few of them require special conditions of soil or exposure; and generally speaking, they will grow where placed.

Chervil and Mints give best results in soils that retain a considerable amount of moisture, and in partial shade. Most herbs flourish without the addition of fertilizer. Added richness generally makes for better foliage, but it may les-

Branches of Roman Wormwood
(*Artemisia pontica*)

McFarland photo





McFarland photo

Flowering branch of Sage
(*Salvia officinalis*)

sen the fragrance. Seeds and plants may be obtained from numerous nurseries specializing in herbs, and from many large seed houses.

Raising herbs from seed is not always practical when only a few plants are desired. The gardener may find it best to obtain nursery-grown plants, or divisions, or to propagate from cuttings. It may be wise to purchase plants of Lavender, Mints, Wormwoods, Rosemary, and Lemon-verbena, as seed germination and growth from cuttings are slow. French Tarragon cannot be grown from seed, and is best propagated in the home garden by division. Seeds of many annuals, such as Cress, Chervil, Pot-marigolds, and Nasturtiums, may be sown directly in the ground.

In order to have sizable plants early in the spring, it is generally best to sow seeds of sweet Basil, Summer Savory, Fennel, and Sweet Marjoram, in flats in-

doors or in a cold frame. Plants of Lemon Balm, Chives, Mint, Horehound, Rue, and Costmary, may be increased by dividing the clumps in the spring or early autumn. In the North, it may be advisable in many localities to mulch plants of Lavender, Tarragon, and Germander with leaf mold or peat-moss; and some gardeners protect their herb plants with pine boughs.

Harvesting and Storage

To make it easy to snip off fresh sprigs for kitchen use, grow a few of the culinary herb plants near your back door.

When gathering herbs for drying, cut the leafy stem just before the plant blossoms, when the volatile oils are especially abundant—preferably on a sunshiny day after the dew has gone from the plants. The tender leaf herbs, Basil and Sweet Marjoram, should be dried rapidly. They may be tied in loose open bunches and allowed to hang in the sun, on the porch, or in an airy sunny room for a short time. Several crops may be harvested from some herb plants during the season. The flowering spikes of Lavender should be dried on their stems after the first few flowers have opened and the remainder are in bud.

The seed crops, Coriander, Caraway, Dill, and Anise, should be gathered (with stems as short as possible) when the color of the seed head changes from green to brown. Spread them out in a dustless, dry room on a clean cloth, and turn the seeds frequently. After about a week remove the stems and chaff.

As soon as the herb leaves and seeds are dry, place each kind in a separate, airtight glass container, in order that the essential oils shall not escape. Label the jars. Use containers that light will not penetrate, or store the jars in a dark room; this will make the herbs more attractive for culinary use by preserving the green color.

Garden Uses

We find many attractive herbs that add charm to a garden. The following have lovely and fragrant flowers: Clove Pink (Carnation); Bee-balm, in its shades of pale pink, lavender, and red; Pot-marigolds (*Calendula officinalis*); and Nasturtiums. Even the Chives produce interesting clusters of round mauve balls, while the showy mass of yellow racemes of Woad (Dyer's Weed) adds interest in the background of the garden.

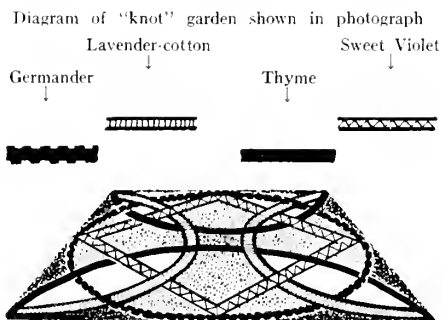
Intricate and elaborate designs may be worked out with turfed diagonal paths, or colored gravel, creating a "knot" garden. After a garden of this nature becomes well established, it can be very picturesque. A great many plants are needed for a "knot" garden, as they must be placed close together; and it may be necessary to carry out a continuous shearing program. There are numerous plants to choose from, if one is interested in working out a simple ribbon pattern. Among these are Germander (*Teucrium Chamaedrys*), with dark glossy leaves, not dependably hardy in the North; Roman Wormwood (*Artemisia pontica*), with lacy gray-green foliage; Rue* (*Ruta graveolens*), having blue-green foliage; and Hyssop (*Hyssopus officinalis*), with narrow, dark green leaves.

A gray garden may be made of herbs, and is particularly interesting at twilight as the shadows lengthen. Group several

*We suggest protecting the hands with gloves while handling Rue, as it irritates some skins.

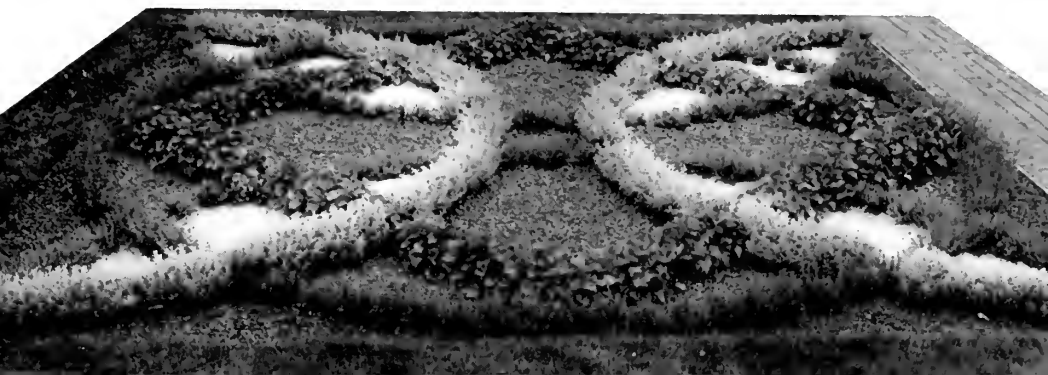
plants of a kind together for the best effect, and repeat at intervals. Several of the Wormwoods fit into this type of garden. Among them are Roman Wormwood (*Artemisia pontica*); Dusty Miller (*Artemisia Stelleriana*); Silver King Artemisia (*Artemisia albulu*); Fringed Wormwood (*Artemisia frigida*); and *Artemisia Schmidtiana*, with attractive, finely-cut, silvery foliage. Other suitable herbs are Sage (*Salvia officinalis*), Lambs-ears or "Woolly Betony" (*Stachys lanata*), a variety of Mother-of-thyme (*Thymus Serpyllum lanuginosus*), and the tender Lavender-cotton (*Santolina Chamaecyparissus*).

When using Mints in the garden, it is wise to wall them in with stone or metal, as the roots spread rapidly underground. Grow the tiny Corsican Mint (*Mentha Requinii*), or Pennyroyal (*Mentha Pule-*



gium) between crevices in the flagging. When these are trampled, their strong minty fragrance will permeate the immediate area.

"Knot" Garden exhibited by Brooklyn Botanic Garden at New York World's Fair, 1939



Indoor Uses

Some people like to pot up a few herbs for indoor use during the winter. For this purpose it is wise to sow seeds or make divisions late in the summer, rather than to take up old exhausted plants. Indoors the plants must have full sunlight and a moderate temperature; if kept too warm, they become ungainly. Herbs are attacked by few pests, but watch should be kept for white flies and aphids.

There are unlimited uses for herbs. It might be said, "You cannot use all the herbs all of the time, but you may use some herbs some of the time." In cooking with herbs, use too little rather than

too much. In making a sweet jar or potpourri, one will like the blend of certain dried herbs and flower petals more than others. The scented Geraniums are a delightful addition to the garden; their fragrances are many and varied. The foliage may be used in flower arrangements, nosegays, and finger bowls, and in apple jelly when it is poured into the jar to jelly.

The pleasure of being among the herb plants as the dew falls, rubbing the soft, plushy foliage of Peppermint or Geranium, or crushing a leaf of Lemon-ver-bena, makes one forget troubles and problems, to rejoice and relax amid this beauty and fragrance.

Lavender-cotton (*Santolina Chamacyparissus*)

McFarland photo



DEVELOPMENT OF A SMALL PLACE

Gradually, through the owners' efforts

Joan Seltzer

MUCH pleasure may be derived from developing one's own property and watching it grow over a period of years. The small landowner may spend as much or as little as he wishes; and with a certain amount of ingenuity, may attain pleasing results. He must be especially careful not to plant in excess and thus crowd all his plants. Crowding produces poorly shaped trees and the feeling of overpowering growth.

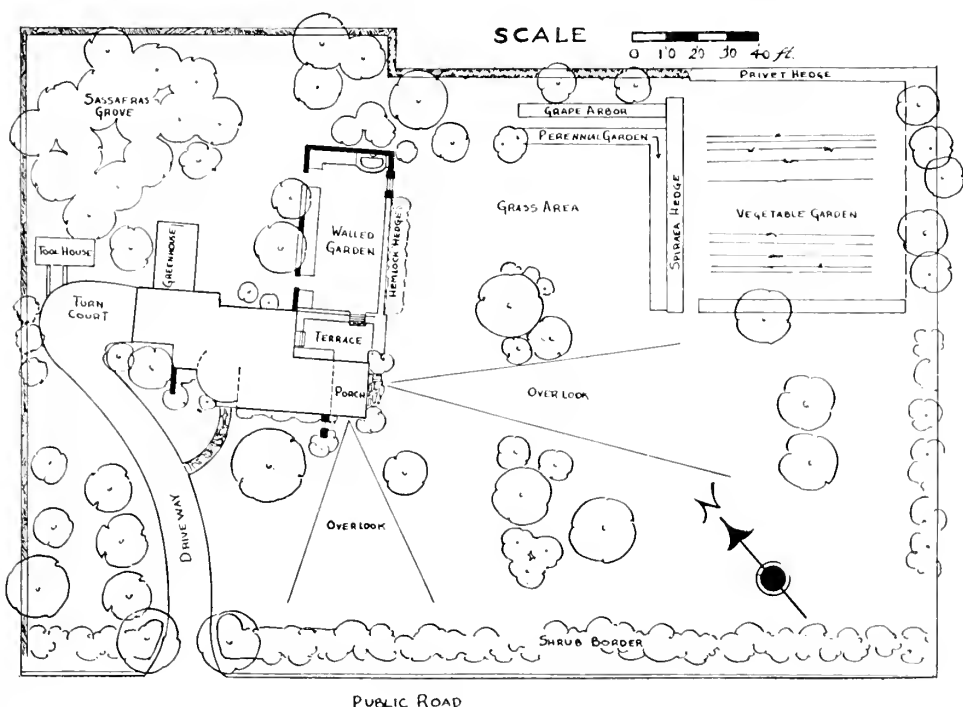
Our property consists of a little more than an acre and a half. The house was built in 1928 in an open field; and with

the exception of a small group of Sassafras trees at the garage end of the house, there was no planting of any kind.

Nursery and Border

The first step in developing this barren site was to plant a 25-foot Pin Oak on the front lawn, and to start a small evergreen nursery. Japanese Yew (*Taxus cuspidata*), *Taxus media* var. *Hicksii*, Hemlocks, Box, and Rhododendrons were started in the nursery, to be used later for shrub planting around the house.

A tree and shrub border was planted along the front of the property, and three Hemlocks on one side of the driveway. The border, 10 feet in depth, has been gradually developed until it is now a fine display of many flowering trees and



shrubs. The main motif is the Flowering Dogwoods, which are spaced every 25 feet. There are also flowering shrubs interspersed with groups of Pines and other evergreens. On the outside of the border Roses add a touch of color in June, while on the inside, Daffodils are grouped in masses. At the entrance, Chinese Elms on either side arch across the driveway. Rhododendrons and Laurel are clustered beneath the Elms.

Foundation Planting and Vista

Against the house, *Ilex*, pyramidal Yew, and *Cryptomeria* relieve the long stretch of white stucco. Groups of *Retinosporas* at the corners of the porch and house have been replaced by Rhododendrons.

This has been one of the main corrections of the early planting.

In 1933 a 4-foot Willow sprig was planted about 30 feet from the porch, at the end of the nursery. The tree has grown into a beautiful specimen. When the nursery was given up in 1935, a Sweet Gum, an Oak, Dogwoods, and Lilacs were planted to make a vista to the end of the property. Daffodils are naturalized beneath the trees.

Walled Garden

A walled garden, which was excavated to the depth of 2 to 3 feet below the level of the porch and terrace, was built in 1939. The wall cuts off the view of the back yard and utility area, and also pro-

Walled garden in summer

Author photo



teets the garden from the northwest winds. This garden was built by the owner with the aid of a stone mason and an extra laborer. Thus, the building cost was approximately one fourth of the estimated price, and was done over a period of six months. Cinder block painted white, an inexpensive material, can be used almost as effectively as the field stone was in this case. This outdoor living room is enclosed by a 7-foot stone wall on two sides, and a Hemlock hedge on another. The porch and part of the house form the fourth side. This feature enables us to enjoy the garden from the shady porch and living room windows. At the lower end of the garden is a small lily pool with a fountain. Three White Birches centered at the back of the pool form an attractive backdrop. A small Willow tree bends gracefully over one of the walls. Lilies, Day-lilies (*Hemerocallis*), Tulips, Daffodils, Chrysanthemums, seedling Dahlias, Delphinium, Lantana, and Asters are planted in

the flower beds, and give color throughout the spring and summer.

Vegetable Garden and Greenhouse

At the time the walled garden was built, the vegetable garden, 80 × 80 feet, enclosed by *Spiraea Vanhouttei*, was moved back in order to open up the lawn and provide more space for perennial flower beds; and fruit trees were planted behind it.

The next addition was a small greenhouse for raising annual flowers and starting vegetable plants in the early spring. The children's playhouse, not far from the greenhouse, was converted into an attractive tool house.

The Sassafras grove has been planted with Irises and Daffodils. Small Hemlocks have been planted, which one day will take the place of the Sassafras trees.

The pleasure and satisfaction which this place now gives us has been greatly enhanced by seeing it develop through our own efforts.

THESE THINGS CALLED BULBS

Including corms, tubers, rhizomes, and roots

Hester M. Rusk

TO a gardener, a "bulb" or a "root" may be any dormant fleshy underground part of a plant that can be set out or potted and expected to grow into a new plant. (Not a seed, of course: seeds are not ordinarily produced underground, and everyone recognizes them as distinct. When a farmer speaks of "seed potatoes," he means potato *tubers* that are to be planted rather than eaten.) For practical purposes, it makes no difference how these "bulbs" or "roots" are formed, or what plant organs they consist of; and so a gardener often wonders

why they are called by so many different names in the books. Actually there are several distinctly different kinds; and a real horticulturist does not like to confuse corms and bulbs, any more than a cabinetmaker wants to call walnut mahogany.

A true bulb is really a giant bud.—A Rose bud is a partly developed Rose flower—a *flower bud*. But the Rose canes have also many more buds that produce nothing but leaves (on stems, of course)—*leaf buds*. Most of the buds on a Lilac bush consist (each) of many tiny leaves close together on a very short stem—*leaf buds*. But some of the buds, particularly those at the tips of branches, contain flower clusters as well as leaves; these are *mixed buds*.—At least we hope

our Lilac bushes will produce mixed buds, when they are old enough.

A **bulb** consists of a very short stem bearing many leaves close together. But



Hyacinth bulb: left, whole; right, cut lengthwise to show flattened stem, storage leaves, and mixed bud in center

the leaves (or leaf bases, as they are in some cases) are not tiny and only partly developed; they are greatly enlarged and packed with stored food. The bulb, then, is a specially modified *leaf bud*. At the tip of the short stem, enclosed by the storage leaves (or scales) there is often a *mixed bud* which will grow up and produce leaves and flowers above the ground. Or the leaf and flower buds may be formed separately, one long ahead of the other. Examples of bulbous plants are: Daffodil, Hyacinth, Tulip, Lily, Onion, Bessera, Galtonia, Hymenocallis, Lycoris, Milla, Sternbergia, Tigridia, Zephyranthes.

All the other things that are called "bulbs," while not essentially buds in



Crocus corm: left, whole; right, cut lengthwise

themselves, must bear or be capable of producing buds; otherwise they could never give rise to leaves and flowers above the ground.

A **corm** is a short underground stem, growing vertically, much thickened and filled with stored food. The scales that

cover it are thin and dry, with no stored food. The buds are on the top and sides of the corm. Examples: Crocus, Gladiolus, Jack-in-the-pulpit, Brodiaea, Montbretia.

A **rhizome** is an underground stem growing more or less horizontally, often thickened and provided with stored food. It usually bears small inconspicuous thin



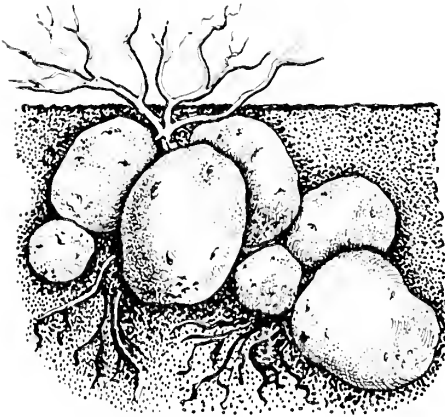
Iris rhizome, showing four years' growth

dry scales. Examples: Iris (some kinds), Solomons-seal. The pips of the Lily-of-the-valley are mixed buds produced on a rhizome.

Lily-of-the-valley rhizome with pips and roots

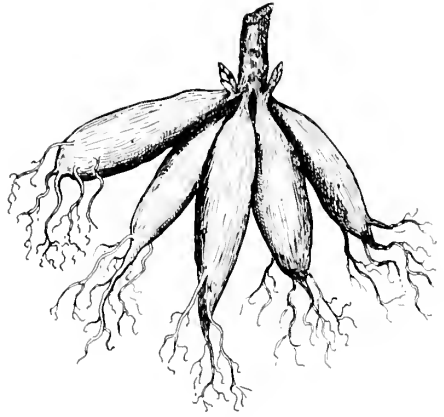


A **tuber** is a food-storing enlargement on a branch of an underground stem. It has leaf buds (in the eyes) which may grow into plants that will produce flowers in due time. Examples: Potato, Jerusalem Artichoke.



Potato tubers attached to plant

Some plants accumulate food in **thickened roots**: sometimes in the one main root (taproot), as in the Beet, Carrot, and Turnip; sometimes in enlargements of root branches, as in the Dahlia and Sweet Potato. On the taproot a part of the stem naturally remains attached, and the buds from this stem take up the later growth. When the clusters of thickened or tuberous Dahlia roots are divided for propagation, each root that is to be planted must be cut with a bit of stem attached, to provide the buds. But in the Sweet Potato the root itself gives rise to buds which can grow into new plants.



Above: tuberous roots of Dahlia

Below: taproot of Carrot



GLADIOLUS

A brief history, with suggestions on culture

A. E. Kunderd

THE Gladiolus is one of the easiest of all garden flowers to grow and care for, and one of the most beautiful. It has been wonderfully improved in recent years, and is now a leading commercial cut flower. Its ease of culture and its long-lasting character in the vase have brought it to the top in popular favor.

The modern flowers come in almost endless color and shade combinations, and in various forms or types. [See color plates.] They are the result of crossing the wild kinds—the species, of which there are well over 100 in South Africa, ranging from 6 inches to over 4 feet in height. Endless possibilities in form and type are yet attainable in the hands of patient and skilled breeders. There are early- and late-flowering, tender and hardy varieties; and some are very fragrant.

One of the principal types or strains of hybrids is the *Gandavensis*, which has flowers closely set on the spike, and many of them open at one time. It is the result of crossing two species, *Gladiolus psittacinus* and *Gladiolus cardinalis*. The next distinct race of hybrids was produced by the infusion of a third species, *Gladiolus purpurcoanratus*, into the *Gandavensis* strain. This gave the beautiful pansy-like blotches of the butterfly race usually known as *Lemoinei*. In this race the flowers are not so closely set on the spike as in the *Gandavensis*, and there are not so many open at a time. Next, the larger or butterfly-shaped *Nanceianus* type was produced, mainly by the addition of still another species, *Gladiolus Saundersii*, into the previously existing races. All earlier races are now so much intercrossed and

blended together that their characteristics are no longer so distinct as at an earlier period. Various colors—white, yellow, blue, etc., were added by the infusion of still other species; and further improvements were made by more crossing and by selection. In more recent years the species *Gladiolus primulinus* has brought about a still greater variation in color, shade, and type than those previously existing.

I am confident that still other beautiful hybrid races will be produced. Much time has been devoted to the improvement of the large-flowered Gladiolus; but we need also the daintier and smaller-flowered and more graceful types. There are probably still undiscovered Gladiolus species which will enable the hybridist to carry on his work of producing other new and beautiful races as yet undreamed of.*

How to Grow Good Gladiolus

Satisfactory results can be achieved by following only a few simple and easily understood cultural directions. Any soil that will grow other good crops is suitable for Gladiolus. It must, of course, have sufficient plant food material. One-year-old manure is very valuable; but if that is not obtainable, a good balanced commercial fertilizer may be used. This should never come into actual contact with the corms.

Planting may be done as soon as the ground can be worked in the spring. For

*Several years ago it was reported that a new and very fragrant species of Gladiolus named *Acidanthera* had been found. It is now considered to be a distinct genus. However, it is possible that some skilled breeder may effect a cross between *Acidanthera* and Gladiolus. Bigeneric hybrids have been reported between *Montbretia* and Gladiolus. Such crosses, however, do not often result in fertile offspring, and for this reason are sometimes known as "mule" hybrids.

row culture, open furrows about 2 feet apart. Plant the corms 4 to 6 inches apart in the row; and about 4 inches below the level of the ground in most soils, or an inch or two deeper in particularly mellow loam or sandy soils.

For garden culture plant the corms in groups of three to a dozen or more among shrubs, or in beds or borders. Such planting will give more attractive results than straight row culture. Planting at intervals of ten days to two weeks from early garden-making time until late June, or later, will give a long flowering season of approximately 100 days.

Summer Care

Cultivation is about the same for Gladiolus as for other garden crops. In the early part of the season the soil may be worked to a good depth; but as the plants develop, cultivation should be shallow so as not to injure the roots. The crust of the ground should be broken after rains, but not while the soil is still wet. In dry spells, it pays to water abundantly once a week rather than watering lightly oftener. A good way is to remove an inch or more of the soil near the plants in late afternoon, pour in the water, and replace the earth early next morning.

When spikes being to form, it is advantageous to hill up the plants several inches to help support their increasing weight, and to keep them from being blown over by strong winds. Staking may also be advisable.

Pest Control

A 1 per cent DDT spray may be used on growing plants for control of thrips. Take 2½ ounces of a 50 per cent wettable DDT powder per gallon of water, and keep it thoroughly stirred while applying it. Spray once a week after the plants have reached a height of 6 to 8 inches. A tartar emetic treatment may also be used for thrips on growing plants. Take 1 ounce of tartar emetic and 2 ounces of brown sugar for 3 gallons of water.

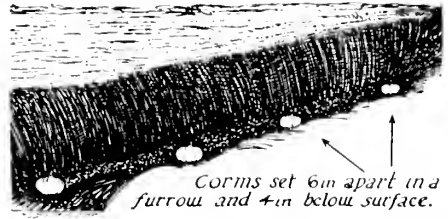


Diagram to show how Gladiolus corms are planted

Spray the plants with this solution every week or ten days. Use it as a fine mist spray, and do not apply it so heavily as to cause the solution to run off the plants.

Cutting

If Gladiolus flowers are cut for the house, leave at least four of the large lower leaves on the plant to mature good corms for the next year. Cut the spikes when one or two flowers are open; the others will open in water. Change the water in vases at least once daily, and rinse the vases well. Remove all wilted blossoms and cut off a half inch of the stems each time you change the water. As soon as the flowering season is over for a spike left in the garden, cut it off just below the lowest flower.

Digging and Storage

The corms are ready to dig about three or four weeks after they have finished flowering. Lift the plants with a fork or spade, and cut off the tops close to the corms. It is best to dig on warm, dry, and airy days, so as to harvest the crop in a dry condition. If possible, cure the corms for a few days in the sun and warm air. Place them in shallow boxes or crates and store them in a warm room or cellar until the old corms can easily be broken away from the new ones which have formed above them.

After another week or so of drying, the corms may be treated for the control

of thrips. One ounce of 5 per cent DDT dust will treat a bushel of corms; it should be blown carefully over them so that they are evenly coated. The corms are then put into their containers for storage—at a temperature of about 40° F. Varieties should be kept separate in small bags.

One of the newest treatments for diseases of the corms is as follows: take 1 ounce of New Improved Ceresan and 3 teaspoons of Graselli's Sticker to 3 gallons of water. Mix the chemicals first with a wooden paddle or stick; and continue stirring while adding the water. Soak the corms in this solution for fifteen or twenty minutes; remove them and plant them promptly. Never use the hands for mixing any of the solutions, or inhale the fumes of chemicals or dusting powders.

Choosing Varieties

Beginners in growing *Gladiolus* need not try the recently introduced high-priced varieties. There are many older varieties, priced as low as 5 and 10 cents a corm, which are still among the best. When some experience will warrant the greater cost, novelties may be tried.

Among many hundreds of named varieties, only a few may be suggested here. Do not omit the deep salmon Picardy, as it is one of the finest. Maid of Orleans is a good medium-priced white. Governor Pinchot is a good pink, but there are many others. In deep violet, Pelegrina is splendid.

The color range in *Gladiolus* is wide. Beginners may carefully read the descriptions in catalogs and visit near-by collections when they are in bloom. Then they can use their own judgment in selecting varieties.

TIGER-FLOWER

The Tiger-flowers belong to the *Iris* Family. While there are more than a dozen species of them in Central or South America, our garden plants come from only one: *Tigridia Pavonia*. The flowers are yellow, orange, and red; and receive their common name, "Tiger-flower," from their many spots and blotches. [See color plate.]

The bulbs should be planted 6 to 8 inches apart, in the spring, preferably in a light rich soil. They are of very easy culture; and they produce many flowers through a long season, although the individual blossoms last but a day.

The plants should be lifted in the au-

tumn, before frost, and the tops left on. They may then be tied in bunches and hung in a warm dry place. Or the tops may be cut, and the bulbs stored in boxes; but then the bulbs must be protected against mice. They will not keep in an ordinary cellar; it is too damp. They are propagated rapidly by offsets. It is best not to take these off the parent bulb until they break away naturally.

Some good varieties of *Tigridia Pavonia* are:

<i>alba</i>	Ruby Queen
<i>canariensis</i>	Red Giant
<i>speciosa</i>	Rose Giant

MONTBRETIAS

Grace and bright color for late summer

Avis Campbell

BOTANISTS give the name *Tritonia* to a genus of cormous herbs native to South Africa. Gardeners usually prefer to call the modern garden forms Montbretias. They are commonly thought of as late-summer-blooming "bulbs."

Montbretias should be more generally known in our gardens. Their graceful spikes of flowers, resembling miniature Gladioli, are useful among the perennials in the border. They are excellent subjects for cutting, and lend themselves nicely to flower arrangements requiring flowers of more delicate texture than the giant Gladioli of our contemporary gardens but having their distinctive form and good color values. They are used to best advantage in full sunshine where their bright colors will gleam like jewels among the surrounding foliage groups.

Varieties and Uses

Montbretias have not the colors of delicate spring or early summer flowers. Their colors are strong and vigorous, and they should be planned for the fall border where autumn reds, yellows, and bronzes predominate. The variety George Davidson is typical, with pale orange-yellow flowers which blend well with Day-lilies (*Hemerocallis*), Snapdragons, the orange and yellow Zinnias and Marigolds. His Majesty, a velvet-scarlet, blends with the reds and oranges of a gay fall border. Queen Alexandra, a light golden orange, and Fire King, a good scarlet-red, are

both varieties of brilliant color which can be used with the new Day-lilies blooming in August and September, and with Trol-lius and Calendulas.

Though their colors are brilliant, the individual form of a Montbretia is delicate. They should, therefore, be planted in large enough groups to give adequate color value to their position in the garden. Each group should consist of from eight to ten bulbs planted 4 inches apart. Two plantings are possible; the first as soon as the frost is out of the ground, and the second early in June. They bloom approximately four months after planting.

Culture

Montbretias are easily cultivated. Without protection they are not hardy north of Philadelphia, but if they are planted 6 inches deep in a light, rich soil and are given a 2-foot covering of leaves in the fall after the ground has received a crust of frost, they will increase rapidly and will bloom a month earlier than when planted in the spring. They should be dug up and divided every two or three years. Care should be taken not to cut either the tops or the roots, and to save all small corms attached by runners to the original bulbs. If they are to be stored over the winter, they should receive the same treatment as Gladiolus—packed in dry peat-moss in a cool cellar.

Montbretias are not usually subject to diseases or pests, but may be bothered by thrip and red spider if they are planted in too dry a location or if the season happens to be unusually dry. The dusts and sprays recommended for Gladiolus will control these pests.



TUBEROUS BEGONIAS

*Colorful, summer-blooming plants
for the shade*

Carlton E. Lowe

THE tuberous-rooted Begonia was originally found on the mountain sides of Bolivia, sometime about the beginning of the nineteenth century. The plants were not very large-growing; and the blossoms were small and single, with about four petals each, in very few colors, mostly light ones. It was because they had a tuberous root system that they were sent to England to be worked with.

The first "bulbs" and seeds were sent to Henderson in England about 1847; more were sent in 1864 to James Veitch, who used these as parent stock. Then came the crossing and recrossing, until tuberous-rooted Begonias began to take on a look of some beauty. Lemoine, the French hybridist, began working on them about 1870, and was reportedly the first to create the double form. Since then a great many men have made improvements. At present, Frank Reinelt of California is the leader.

The tuberous Begonia was introduced into the United States about 1880, and

was grown to some extent from then until the plant quarantine of 1919. Bulb importation then practically ceased until the quarantine restrictions were eased a few years ago. During that period American growers learned to raise plants from seed. In certain sections of the country, bulbs are grown that are superior to those formerly imported; but they are more expensive. Our best bulbs are now California-grown.

Culture

Light. In this country tuberous Begonias must be grown in shade. This is a godsend to the average homeowner; for there is always some shade around the house, and it is difficult to find plants that will give color to such a situation. In Belgium, northern France, and Germany, where summers are cool and the humidity high, tuberous Begonias grow in full sun like Geraniums. But in a country that has hot enough days to grow corn, and the midday temperature goes much over 75° F., tuberous Begonias must be shaded. It is not the sun that is bad for the Begonia, but rather the heat and the lack of humidity.

These are plants that can be used along a wall or building that faces north, where there is a good strong north light but very little direct sunlight; or in an easterly exposure where a little sunlight is filtered through the leafy branches of trees.

Soil and moisture. They need a light, well-drained soil, and a good deal of water, but won't stand wet "feet." In preparing a bed for outdoor planting, the following is an ideal soil mixture: $\frac{1}{4}$ good garden soil, $\frac{1}{4}$ coarse sand, and $\frac{1}{4}$ well-rotted cow manure. This mixture is, of course, for sections where clay or clay-loam is prevalent. Where a sand-loam or sand soil is prevalent, less coarse sand should be added.

Prepare the beds about a foot deep, even though the roots will not go so deep as that. The plants are very shallow-rooted; the added depth is to allow the excess moisture to drain off below.

When weeds appear in the bed, pull them; don't hoe, as that may cut off a lot of feeder roots which are very close to the surface. In the hottest summer weather it is advisable to syringe the plants once or twice a day—not heavily enough to wet the soil, but only to dampen the foliage and bloom. This is done for two reasons: first, the plants need high humidity—and in the heat of summer this has to be created artificially with a fine mist; second, the plant absorbs almost as much moisture through its leaves as through its roots.

Begonias have few enemies. One doesn't have to worry continually about insecticides or fungicides. There is a damping-off fungus, whose growth is usually promoted by too much water on the roots. The beginner should grow them a little on the dry side until he has learned by experience how much water they will stand.

The plants respond nicely to summer feeding with a liquid such as manure water, or a liquid commercial fertilizer that has an analysis of about 4-12-4.

Space. If plants are potted, use large pots, so that the roots may spread.

Plants should be spaced about a foot apart each way, and planted only to the same depth as they were in the pots. Bulbs should be covered about an inch over the crown.

Time. In the vicinity of Cleveland it is not safe to plant outside before June 1. If there happens to be a wet rainy period at that time, it is better to wait a few days longer until more settled weather arrives. Although the tuberous Begonias thrive in cool temperatures, they do not do well if they are taken from a house or greenhouse at 65° or 70° F. and planted out at a time when the night temperature may drop to 40° F. It is wise to wait until the weather is a little settled, before planting out.

Starting plants into growth too early (more than six weeks before planting-out time) makes them leggy and spindly. Bulbs that have been started indoors about the latter part of April should start blooming shortly after being planted out, about the second week in June. They will continue through most of the summer, but will dwindle toward the last of the season. Seedling plants, starting to bloom about the first of July, will continue until cut down by frost in the fall. The seedlings seem to gain vigor all through the season, and increase in size and quantity of bloom; while bulb-grown plants reach their maximum in August, and go slightly down hill from then on. It is good to use both seedling and bulb plants, to prolong the blooming season.

Winter Storage

Many people wait until frost has cut the foliage before digging the bulbs. It is better to dig and pot them before frost. Set the pots in the garage or basement, and water them only a little, letting the tops dry down. This causes the strength to go back to the bulbs, so that they mature better and have a better chance of lasting over the winter.



Photo courtesy of McCall's Magazine

Tuberosa Begonias, showing various flower types and leaves

When harvesting plants that have been cut down by frost, dig them with a ball of soil about the size of an indoor base-ball. Place the balls of soil side by side in a box and set them where they will neither freeze nor get too hot. This helps the bulb to mature in the soil without drying out and shriveling up. In April rub the old roots and soil from the bulbs, and they will be ready to grow.

In sections of the country which do not have a long enough growing period to ripen the bulbs, these methods are the best now known.

Growing Plants from Seed

If you wish to grow tuberous Begonias from seed, *don't give up the first time*. The seed is finer than dust, and must have special care as to humidity and temperature for the first six weeks after planting.

Early in January fill a flat or pot, to within an inch of the top, with very loose and finely sifted leaf mold. Sow the seed on top of this mixture, very thinly; water it, and cover it with a pane of glass to help maintain humidity.

The seedlings will begin to appear in about ten days. At this time the glass must be removed. About a week or ten days after the seedlings appear, the tiny plants should be transplanted into another flat of leaf mold, spaced about 1 or 1½ inches apart each way. At this time the whole plant is about the size of the head of a common pin. The plants are too small to transplant with the fingers. By the time they are large enough to handle, they are so tangled that it is almost impossible to separate them without injury. A good tool for the first handling can be made from a common Spencerian writing pen, with the point bent out so as to form a small fork at the end.

As the plants grow and begin to fill the flat, they may then be potted, or transplanted to another flat (spaced more widely) until bedding-out time comes, about June 1.

Types of Plants

There is now a wide range of colors, running from pure white through pink, salmon, yellow, rose, carmine, copper, orange, and red. There are also a good many bicolors. The plants fall into about four classes: namely, the Singles and their variations, the Doubles and their variations, the Multiflora class, and the Pendula or Basket class.

SINGLE

There are four types of Singles. The **Plain Single** is the largest blossom. It has four large petals and is very plain, resembling a Mallow (*Hibiscus*), or a large single Hollyhock. [See color plate.] There are eight or ten separate colors of this type.

In the **Single Frilled** type, the blossoms are not so large as in the Plain Single, and have a ruffled edge all around. There is also a type with unique color formation. The color is white to within ½ or ¼ inch of the edge, which is pink; or the base coloring may be yellow, and the edge reddish bronze. In Belgium this type is called *Marginata*, while in the United States it is called *Fascination*.

The **Single Crested** type has a Cockscomb-like growth on each petal. It is still a four-petaled single type, and comes in eight to ten colors.

Another variation of the Single is the **Narcissiflora** type; it carries a trumpet in the center, like a Daffodil. It is seldom grown, because of its tendency to revert to a semidouble state, and lose the trumpet effect.

DOUBLE

The double tuberous-rooted Begonias are divided into four types, namely: the *Camellia* or **Giant Double** type, which is the favorite of all the tuberous Begonias, mainly because it is the best known; the *Carnation* type; the *Rosebud* type; and the *Picotée* type.

The **Camellia** or **Giant Double** type is a very large double blossom, which varies

somewhat in form. It is very double, resembling either a full-blown Rose or a Camellia, and is of solid color. [See color plate.]

The **Double Ruffled** or **Carnation** type is very double; and each petal has a fluted or cut-leaf edge like a beautiful large carnation. [See color plate.] The white one looks so much like a carnation that a person who is seeing it for the first time often smells it; but of course there is no fragrance. There are eight or ten separate colors and several combinations.

The **Rosebud** type is well named. It is a wonderful bicolor. It is formed like a large Rose bud just starting to open, and the center of the flower always carries the "Rose bud" until all the petals are folded back. The face of each petal is light, and the back a darker shade of the same color; this causes the two-tone or bicolor effect.

The **Picotée** or **Marmorata** flower is of the same form as the Giant Double, and has a very pleasing set of colors. The Giant Double or Camellia type is always of solid color; while the Picotée may be spotted, mottled, striped, or edged with a contrasting color. There are so many color combinations, that the only way to classify them is by their predominating colors, with the markings coming as they may. For instance, a Picotée rose will be a large double rose-colored flower, edged, spotted, or marbled with white, copper, cream, or almost any contrasting color. There are now available about five predominating colors of this type, and they are listed that way.

MULTIFLORA

The third class, Multiflora, is coming to the front very rapidly. There are at present about eight separate colors. This plant does not grow so tall as those in the other two classes, nor have leaves so large; it has more flowers, although these are a lot smaller—about the size of a quarter. As the name implies, it is many-flowered. This class is good for bordering the tuberous Begonia bed. The plants

are a little hardier than the others, and will stand a little more sunlight. They grow bushy. The flowers combine well with the large Doubles in corsages and table arrangements.

PENDULA

The fourth class is the Pendula or Basket class. It has been improved greatly in the last few years, especially in size and quantity of bloom. It is a hanging plant, useful in baskets, on the edges of boxes, or in shady rock gardens. The flowers are very double, nearly as large as a silver dollar; and many are open at the same time. It is necessary to watch the watering very closely, because in a basket or box the drying of the soil may be very uneven. If the baskets are suspended in the air, the plants will require more spraying to create extra humidity.

Use as Cut Flowers

The flowers may be used effectively in low table decorations, and as corsage and wedding flowers. Pick the blossoms in the morning before the day gets too hot; sprinkle them with a fine mist of water (they absorb more moisture through their petals than through the stem); float them in a shallow dish of water, or keep them in the icebox for a couple of hours to harden the flowers. Then use them as desired. In corsages, or similar arrangements, the flower must be wired; otherwise the stem may snap off just under the blossom. The flowers look rather fragile, but they can stand a lot of abuse; they do not turn brown when handled, like Gardenias, nor shatter like Camellias. If a few petals have bad edges, they may be picked off with the thumb nail.

While these lovely flowers have very definite needs, it is not too difficult to meet these requirements. Their beautiful colors and varied forms always win admiration, and will bring great joy to the gardener.

LYCORIS

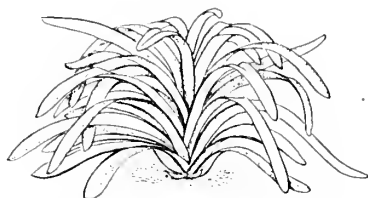
Long-lived bulbs for August bloom

Rex. D. Pearce

ALTHOUGH there are other interesting species of *Lycoris* in China and Japan, original home of the genus, only two are likely to be found in our gardens, *Lycoris radiata* and *Lycoris squamigera*. A third, *Lycoris aurea*, may be grown as a pot plant. These three species are alike in having umbels* of waxy, rather trumpet-shaped flowers on long, leafless stalks, the blossoms appearing before the foliage at the end of the resting or dormant period that all *Lycoris* species seem to require.

Lycoris squamigera (once cataloged as *Amaryllis Hallii*) is winter-hardy without protection in the open ground in the Middle States; and with benefit of straw or leaf mulching, will winter in upper New York, New England, and areas of like climate. It is sometimes called "Hardy Amaryllis." [See color plate.] The bulbs are usually planted in early fall, but sometimes in early spring. They may take a year to make root growth and full adjustment to a new position, and not bloom at all the first season after they are moved. The second season they should flower freely; and like other plants that take a season to become established after being moved (Peony, Dictamnus, etc.), they are rather long-lived. The leaves grow in late summer and fall, perhaps a bit even during mild periods of the winter. In the spring the foliage dies down, and there is no sign of the colony until early August. Then, of a sudden, the bud-carrying stem rises through the soil

* Umbrella-like clusters.—Ed.



Leaves of "Hardy Amaryllis"
(*Lycoris squamigera*)

to a height of some 25 inches. The flowers might be described as somewhat flaring, divided trumpets. The coloring is in opalescent effect, more or less lilac, but appearing anything from blue to pink according to the lighting.

Lycoris radiata may be given precisely the same garden handling as *Lycoris squamigera*, for it has about the same growth habits. Unfortunately, it is somewhat more tender, and cannot be grown outside in climates as cold as *Lycoris squamigera* will stand; but it does well as a garden bulb at Philadelphia. In colder places it may be handled in pots, in window garden or greenhouse. The flowers are a deep sparkling red, the segments rather more deeply cut and recurved than in *Lycoris squamigera*. Formerly it was confused with, and sometimes offered as, the Guernsey-lily (*Nerine sarniensis*) to which it does indeed have a rather strong superficial resemblance.

Lycoris aurea is perhaps the most beautiful of the three species described here; but it is also the most tender, and save in the deep South, it must be considered altogether as a pot plant. The growth habits and flowering times are about as in the other species, but the flowers are a rich, true golden yellow.

TENDER BULBS FOR SUMMER BLOOM

Unusual flowers for a little extra care

Elizabeth Lawrence

TWO members of the Lily Family that come from the mountains of Mexico and are grown in California, can also be grown in the East if the bulbs are lifted in the fall and stored like *Gladiolus*. One is Mexican Star (*Milla biflora*); the other, Coral-drops (*Bessera elegans*). The bulbs should be planted in the spring, 4 to 6 inches deep in a light, rich soil. Good drainage is essential, but water must not be lacking from the time growth starts until just before the flowers bloom. They bloom from July to September.

The fragrant white blossoms of *Milla biflora* are six-pointed stars, striped on the outside with pale green. There may

be several flowers to a stalk, but as the name (*biflora*) indicates, there are usually two. The leafless wiry stalks are 12 to 18 inches long. The basal foliage is blue-green and grass-like. Millas can be grown indoors for winter and spring bloom—treated the same as *Freesias*.

The flowers of Coral-drops are in sprays of five to ten, dangling like little bells from the tip of a 2-foot leafless stalk. The bells are scarlet outside; and within they are cream-colored with orange stripes; the stamens are blue. The few inconspicuous leaves are about the length of the stalk. Bulbs sold as *Bessera elegans* often turn out to be *Milla biflora*.

Zephyr-lilies

Among the easiest and most rewarding of the smaller members of the Amaryllis Family for summer bloom are the Zephyr-lilies (*Zephyranthes*) and their hardier relative, *Sternbergia lutea*. *Zephyranthes candida*, probably the hardiest of the Zephyr-lilies, is said to survive the winters of New York when planted in a sheltered place. The others should be lifted in the winter, and stored in sand.

Zephyranthes grandiflora, best known as a pot plant, is native from southern Mexico to Guatemala. When the bulbs are planted out in the spring, they bloom in the garden throughout the summer. The large flat flowers are Spinel-pink, on stalks about 8 inches tall. This species is commonly known as *Zephyranthes carinata*, and is often sold as *Z. rosca*.

Zephyranthes robusta (now called *Habranthus robustus*), from Argentina, is one of the very best summer bulbs for the garden. The white flowers are flushed with pink. They are large and Lily-like; and where the ground is moist and rich, they bloom at intervals during the summer. Apparently they can be planted at any time, for bulbs planted in October have bloomed very soon after they were

Mexican Star (*Milla biflora*)

McFarland photo



put out. *Zephyranthes candida*, another South American species, produces quantities of small white Crocus-like flowers in late summer and fall. They are crowded among the shiny green rat-tail leaves. Similar, but even lovelier, is *Zephyranthes Ajax*, a hybrid between *Zephyranthes candida* and *citrina*. The lemon-colored flowers come in August and September.

These, I think, are the best kinds for the summer garden. I have many more in my garden in North Carolina, but I am not sure how well they would do if they were planted where they had to be lifted in the fall. The Zephyr-lilies are sometimes called Rain-lilies because they bloom after showers. They bloom better in a moist soil than in a dry one. They need a soil that is on the acid side; and mine do well with a yearly mulch of cow manure. They will bloom in some shade, but full sun is more desirable.

Sternbergia

The Zephyr-lilies are American plants, but *Sternbergia* comes from the Mediterranean region. *Sternbergia lutea*, the only kind common in cultivation, is sometimes called the Winter-daffodil or Fall-daffodil, or the Fall-crocus. The Crocus-like flowers are the color of a Daffodil. Sternbergias are said to be hardy as far north as Boston; but they bloom better in my garden when they are lifted and replanted. They can be put out at any time during the summer; and even if planted late in August, they will bloom in the fall of the same year. They bloom in September and October. The narrow strap-shaped leaves come up with the flowers, and mature during the winter. Both flowers and leaves are very resistant to frost. Sternbergias grow in any good, well-drained soil; with me they bloom in sun and in shade; but they are said to do better in a warm position in full sun.

Sternbergia lutea

McFarland



AWARD TO LIBERTY HYDE BAILEY

"My life has been a continuous fulfillment of dreams"

SO said Dr. Liberty Hyde Bailey, dean of American plant scientists, and world-famous botanist and horticulturist, before 200 friends, colleagues, and former students, April 29, 1948, at a dinner given in his honor by Cornell University.

The dinner marked Dr. Bailey's 90th birthday, which he passed alone, March 15, on an island in the Caribbean Sea, in search of Palm specimens to be added to the collection of 200,000 plants at the Bailey Hortorium, the unique botanical institution which Bailey founded after retiring as Dean of the New York State College of Agriculture at Cornell in 1913.

Medal

Before the dinner, Dr. Bailey was awarded the Johnny Appleseed Memorial Medal by the Men's Garden Clubs of America for meritorious service in horticulture. The medal was presented at an afternoon ceremony in the Bailey Hortorium by E. L. D. Seymour, a former student of Bailey's, and now Horticulture Editor of *The American Home* magazine.

Dr. Liberty Hyde Bailey receives the Johnny Appleseed Memorial Medal for "Meritorious Service in Horticulture" from E. L. D. Seymour for the Men's Garden Clubs of America

Sol Goldberg photo, courtesy of Cornell University



The medal—the first to be awarded—is named for Johnny Appleseed (John Chapman), who was born in Massachusetts about 1774, and spent his life in the frontier country of Ohio, Illinois, and Indiana, planting Apple trees, many of which became the foundation of modern orchards in that region.

As he presented the medal, Seymour said: "We want you to know of our friendship and good will; of our admiration for your long and so rich and productive life, and your many contributions to the beauty and fruitfulness of 'The Holy Earth' and to the welfare of the people who live on that earth."

Acknowledging the award, Dr. Bailey recalled his father as a kind of "Johnny Appleseed." In 1847, the elder Bailey walked from Vermont to the Michigan frontier, carrying Apple tree seedlings on his back.

Address

Dr. Bailey's address at the dinner was an hour-long reminiscence of his 90 years. "I have lived half the life of this republic," he remarked. He said that on his birthday he had found three Palms never before described by man. He spoke of his early years as a boy on a frontier farm, of the 300 Indians who lived on the Bailey homestead, of the now extinct passenger pigeons which he helped the Indians net as a boy, of splitting fence rails, of the awakening of his interest in plant and animal life, of his early schooling, and of his global travels in search of plant specimens.

Dr. Bailey lauded the virtues of hard, honest labor and declared that "all the world is good." He spoke of the books he has written—65 of them—and said that his "opus magnum has not yet been begun." In conclusion, Dr. Bailey asserted: "The measure of life is in the day-to-day living of it. The earth is good and it is a privilege to live thereon. My life has been a continuous fulfillment of dreams."



Tritonia (Montbretia) varieties

Especially fine as cut flowers,
or for planting in clumps in the flower border.

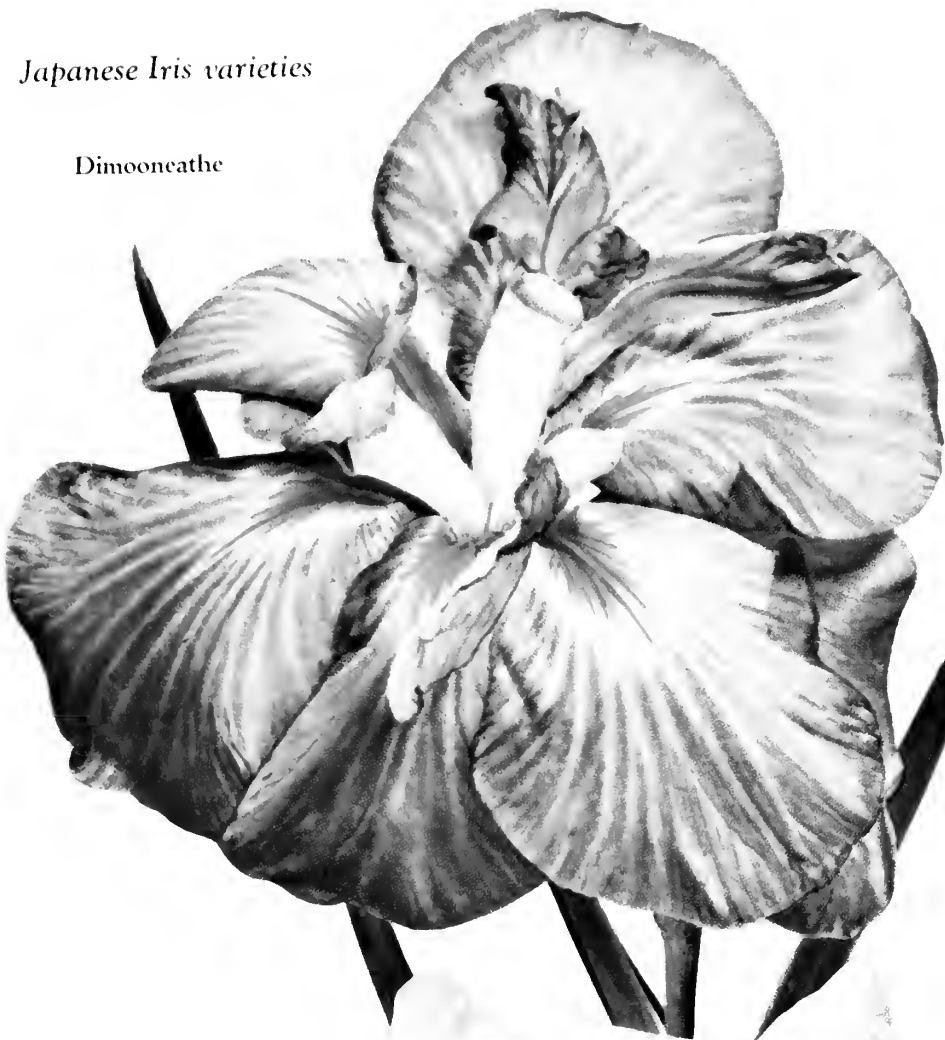
Culture the same as for *Gladiolus*.



Tiger-flower varieties (*Tigridia Pavonia*)
Easily-grown bulbs producing large flowers
with striking colors in late summer.

Japanese Iris varieties

Dimooncathé



Mountain Glacier



Giant Summer-Hyacinth (*Galtonia candicans*)

A summer-blooming bulb
for the flower border.





Hardy Amaryllis (*Lycoris squamigera*)

These attractive flowers are produced
in August
after the old foliage has died down, and before
the new leaves come up in the fall.

Tuberous-rooted Begonia varieties

Double-frilled →

Single ↓

Camellia-
flowered
↓





IRISES FOR THE WATERSIDE

Blooming from late May to mid-July

George M. Reed

FOR planting along the margin of a brook or pond several kinds of Iris are suitable, especially the Siberian and Japanese varieties, and the Yellow Flag of Europe. All of them are valuable not only for their flowers but also for their foliage, which serves all through the growing season as an excellent background for other plants.

Siberian Iris

The Siberian varieties bloom along with the Tall Bearded Iris, beginning in late May and continuing well into June. They have narrow leaves, and slender stems bearing two to several flowers well above the foliage.

The garden varieties have been derived from two widely distributed species. One of the species, *Iris sibirica*, occurs in Europe, from France on the west, through Germany, Hungary, and Central Russia. The specific name is a misnomer, since there are no records of its occurrence in Siberia or other parts of Asia. The wild plants from different localities vary a great deal. They are characterized by narrow leaves and slender hollow flower stalks. The flowers are some shade or tint of blue, with a small yellow patch at the base of the fall. White or albino forms occur.

The second species is *Iris orientalis*,

native to eastern Asia, and extending through Manchuria and Korea to Japan. The flower stalks are relatively short, but the two flowers are borne above the narrow recurving leaves. In Japan this Iris has been appreciated for a long time, and many variants have been selected; two of these, Blue King and Snow Queen, were introduced into England about 1900.

Since then many varieties have been developed in England and America from crosses between the two species *Iris sibirica* and *Iris orientalis*. Barr, Wallace, Perry, and Dykes have been active in England, Mrs. Frances E. Cleveland in the United States, and Miss Isabella Preston in Canada, in addition to others.

The color tones are usually some shade or tint of blue, but red-toned varieties are now known: Red Emperor, introduced in 1924; Helen Astor, in 1938; and Eric the Red, in 1944. Fine white-flowered varieties have been developed. Many of the modern varieties have flower stalks 3 to 5 feet tall, which bear several fair-sized flowers.

No yellow-flowered Siberian Iris is known; but two related species from western China, *Iris Forrestii* and *Iris Wilsonii*, are available, both with yellow flowers. Two other Chinese species are fine garden plants, *Iris chrysographes*, bearing rich blue-purple flowers, and *Iris Delavayi*, with blue-toned flowers on tall stems.

All of the varieties produce seed in great abundance; and it is necessary to remove the seed capsules before the seeds

are dispersed, in order to keep the varieties true to type.

Excellent varieties to grow are Caesar, Caesars Brother, Dragonfly, Emperor, Eric the Red, Gatinian, Helen Astor, Mountain Lake, Pembina, Periwinkle, Red Emperor, Sibirica Papillon, Snow-crest, Tycoon.

Japanese Iris

The Japanese Irises rank very high as garden plants. [See color plate.] They have been developed from the wild *Iris ensata* (*Iris Kaempferi*), which grows in eastern Asia and is widely distributed in Japan. The flowers of the wild type are rather small, with three drooping sepals (falls) and three narrow, erect petals (standards). The flower stalks are slender, 2 to 3 feet tall, and bear usually two flowers at the top and one a little lower

down. The flower color is generally some tone of red-purple; but blue-purple, pale-colored, and white-flowered types may be collected.

From this one widely distributed species the Japanese gardeners, in the course of three or more centuries, have developed the very large number of garden varieties—the greatest advances having been made in the early part of the nineteenth century. In some manner, not now known, the Japanese secured certain varieties with greatly enlarged flowers; others in which the petals (or standards) were increased in size and assumed the same color tones and position as the sepals (or falls)—the so-called double-flower types. Further, triple-flower varieties have arisen through the development of additional floral leaves.*

* Standards and falls.

Japanese Iris (*Iris ensata* or *Kaempferi*)

McFarland photo



The flowers of the garden varieties vary greatly in size, in many cases being 7 to 10 inches across. In some the sepals and petals remain nearly horizontal, while in others they droop downward. The color ranges through various tints and shades from dark red-purple and blue-purple, through paler hues, to white. No yellow-flowered variety is known, although a yellow zone is found at the base of the sepals in all the cultivated types as well as in the wild species.

The leaves are about an inch wide and 3 to 4 feet long, dark green in color. The erect flower stalks are 3 to 5 feet tall.

These Irises have a special value in that they prolong the Iris season. The early varieties flower along with the last of the Tall Bearded Irises, about June 10 to 15, in the vicinity of New York; and from that time to the middle of July, other varieties produce a succession of bloom.

The flowers are best viewed from above; and the Japanese gardeners arrange their plantings so that visitors may walk along raised paths or across "Eight-plank" bridges (Hatsu-hashii) and look down at the flowers.

The Japanese Iris was introduced first into Europe in 1857, by von Siebold, a Dutch physician who had spent some years in Japan between 1820 and 1830. The plant was named *Iris Kaempferi*, in honor of Kaempfer, another Dutch physician who spent a year or two in Japan near the close of the seventeenth century. Thunberg, a physician in the employ of the Dutch, spent some time in Japan in 1776-1777, and collected many plants. He first described the Japanese Iris in 1794, and named it *Iris ensata*, the "Sword-leaf Iris."

Japanese Iris Varieties

In the course of the decades, hundreds of varieties of Japanese Iris have been developed. Following their introduction into Europe and America, many of these have been renamed; this has resulted in very great confusion. As late as 1930 an

American nursery renamed a set of fine varieties which had been developed about 1900 in Sapporo, Hokkaido, and introduced under their proper names. To be sure, the Japanese names are difficult to spell and hard to pronounce; but English translations of most of them are available for use.

Seedlings may be grown easily; and if the seed is obtained from a good collection of varieties, many good plants may be secured, most of them hardly distinguishable from named varieties.

Unfortunately, American nurserymen today list very few varieties. A few nurseries, however, are endeavoring to build up good collections of correctly named plants. The following list includes good varieties which will furnish a wide range of shape, size, and color.

1. Dark red- and blue-purple, with the veins not standing out sharply.

Clarice Childs	Mahogany
Violet Beauty	Kongo-san
Kuro-kumo (Dark Clouds)	

2. Lighter tints of blue- or red-purple distributed between the deeply colored veins.

Pink Progress	Ganymede
Hinode-sakura (Cherry Flower at Dawn)	
Light in the Opal	

3. Color between the conspicuous veins with a dotted pattern, sometimes almost white.

Helene	Galathee
Oku-banri	Rose-Anna
Emi-hotei (Smiling God of Fortune)	
Wakamusha (Young Knight)	
La Favorite	

4. Veins not colored; a white zone around the yellow area, with a colored border around the margin.

Akakukurin (Blue Border)
Nishiki-yama (Brocade Mountain)
Aifukurin (Red Border)
Koki-no-iro Kotaka (Favored Color)

5. Sepals (and petals) slightly flushed with bluish or reddish tints between the colorless veins.

Painted Lady Morning Mists
Zama-no-mori (Zama Forest)
Kosui-no-iro (Color-of-the-lake)

6. Sepals (and petals) mottled in appearance, light or dark, blue- or red-purple.

Granite Meiran
Thunder Shower

Japanese Iris Displays

There are many fine Iris displays in Japan. Some of the most noted include Horikiri-yen, Kotaka-yen, Yoshino-yen, and the Secluded Garden of the Empress in Meiji-jingu, all near the city of Tokyo. Similar plantings are found in most parts of Japan. The Mangetsu-kai or Full Moon Society, of Kumamoto, is devoted to the Iris; and at the time of the full moon in June, puts on a splendid display of specimens grown in pots.

The planting of Mr. H. C. Bland, in his Swan Lake Garden, at Sumter, South Carolina, covers a large area and includes many varieties. The Irises are at their best in May and make a glorious display which is visited by thousands.

Yellow Flag of Europe

The Yellow Flag (*Iris Pseudacorus*) has spread widely since its introduction into America. In fact, it is so vigorous-growing and hardy that it is likely to become a weed. It produces seed in great abundance, and quickly spreads along the margin of a brook or pond, crowding out the Siberian and Japanese Irises and also other plants. It is very valuable, however, for its vigorous growth, its tall green leaves, and especially, its yellow flowers, although these are rather small.

Culture

In a moist situation all of these Irises—Siberian, Japanese, and Yellow Flag of Europe—grow vigorously for several

years. The Siberian and Japanese, however, will not endure standing water which freezes hard in the winter. The danger may be overcome by lowering the level of the water in the winter.

All of these Irises may be grown very successfully in the usual garden beds; but good soil conditions must be supplied. The soil should be enriched with humus and well-rotted animal manure. Light applications of a commercial fertilizer in the spring and again in the summer stimulate vigorous growth.

In garden beds these Irises need to be shifted every three or four years. The clumps become large, the rhizomes entangled, and the soil exhausted; and the result is shorter flower stalks with smaller flowers. The Siberian varieties will survive better than the Japanese, but in time a thorough renovation of the plantings must be made.

Transplanting

These Irises may be transplanted any time from spring to early fall. The operation, of course, results in the setting back of the plants and the loss of bloom. Perhaps the best time is in the summer, just after the blooming period; and if the job is done properly, some flowers may be expected the next season. There is less labor involved if the work is done in the spring, just as new growth is starting.

The usual procedure is to dig up the large clumps, chop them up into small pieces, clean out the old rhizomes and debris, and reset in the newly prepared location. The clumps should not be divided into single rhizomes in this operation.

Better results may be secured by keeping a propagating bed and setting out small pieces consisting of two or three rhizomes. After a season's growth, these may be placed where wanted without any further division and will give good results with no more loss of bloom. This is the proper method also for rapid propagation.



Yellow Flag (*Iris Pseudacornis*)

McFarland photo

Diseases and Insect Pests

These Irises are subject to very few diseases; they rarely have the rhizome rot, so destructive to the Tall Bearded varieties. The Japanese Irises suffer from a wilt disease. Plants here and there show wilting and dying of the leaves, and soon the entire clump disappears. The cause is not definitely known (nor the possible remedy). It may be due in part to an insect invasion.

The Iris borer, also very destructive to other Irises, causes relatively little damage. The worst insect pest is the Iris thrips, a small insect which develops beneath the leaf sheath and the bud bracts, and causes a russetting of the tissues and a failure of the flower buds to open. The

thrips may be controlled by two or three sprayings with a nicotine sulfate preparation before the flowering period and again in the summer, to protect the foliage.

Geographical Adaptation

The Siberian and Japanese Irises may be grown successfully in most parts of the United States. They thrive unusually well along the upper Atlantic coast. They succeed in the South where there are at least mild freezing temperatures in winter. In the Great Lakes region they are successfully grown, and in western Oregon and Washington. The Siberian are better adapted to varied conditions than the Japanese varieties.

SPRING STAR-FLOWER (*Brodiaea uniflora*)

Travelers in the South in late winter are likely to see a small, starry white flower blooming in great patches on lawns, apparently very much at home in

the grass. It is known locally as "Star-of-Bethlehem," one of several plants called by that name. In general appearance, it is not unlike the little *Ornithogalum umbellatum* known in northern gardens as Star-of-Bethlehem.

A closer inspection of the southern flower, however, will show that it is daintier, and faintly tinged with blue. Spring Star-flower is another of its names; and its correct botanical name is *Brodiaea uniflora*, though it is often listed as *Tritelia* or *Milla*. It is a native of Argentina. It grows well near Philadelphia, and is hardy in sheltered spots near New York. In these more northern sections it blooms in May. However, it should be planted in groups in the rock garden or in some protected corner, as lawns are not suitable for it in the North. It should have the good drainage all bulbs require, and a winter mulch. One variety (var. *caerulea*) has flowers bluer than the type, and another (var. *violacea*), lavender flowers.

GERTRUDE M. SMITH

McFarland photo



HARDY VARIETY OF SILK-TREE *

Another must

Frank Bailey

THERE are many reasons why this tree (*Albizzia Julibrissin* var. *rosea*) should be planted on every place on Long Island where there is room enough for it to grow and prosper. I know that it will please two people to whom I gave trees wrote last summer that it was the most beautiful plant they had. (That's something, when you give away a tree!) If you learn its name and can say it glibly, people will think you are a talented horticulturist or Latin student; and that is a much-desired pedestal on which to stand!

E. H. Wilson, the great plant explorer, sent me three seeds some fifteen years

* Mr. and Mrs. Bailey have gathered seeds of this tree to be distributed through the Brooklyn Botanic Garden upon request.

ago. I now have a tree whose branches extend over a diameter of about 12 to 15 feet. The foliage is similar to that of the Locust, but more finely divided; it is almost fern-like. The tree begins blossoming about the first of July and continues till September. The pink flowers are in large clusters or heads; and the long conspicuous silky stamens give the appearance of inverted paint brushes.

The tree is hardy on Long Island, but apparently not much farther north. It should be planted in a sheltered situation and should have ample room for lateral expansion. In fertile soil and full sun, it grows so fast from seed that it should become inexpensive. That, of course, is a recommendation, these days.

Don't let the scientific name bother you. If you can't master it, buy the tree just the same and call it by its common name, Silk-tree, or "Hardy Mimosa."

McFarland photo



PLANTS FOR SUMMER GARDENS

Coolness and color with little care

Margaret Lancaster

FOR many people summer gardening seems to be an unending round of hoeing, weeding, watering, cutting, dusting, spraying. These musts often consume too much time. They make gardening all *work* when it should be one of summer's greatest joys. Greater pleasure with less work is possible if one plans for it by selecting plants that will grow untended and unwatched, by reducing grass areas to a minimum, and by using ground-cover plants and mulches which will almost eliminate weeding and watering.

Many trees and shrubs grow year after year without much care. They are necessities in the structure of a garden, and give a feeling of enclosure and privacy. They make cooling shadow patterns, and may be selected also for summer interest of flower and fruit. Summer color schemes should be chosen with deliberation, and then critically judged and improved each year. The following plants (mainly trees and shrubs), grouped according to color, are summer-interest possibilities.

White

White is essential for summer gardens. A few flowering trees useful for shade are the Franklin-tree (*Gordonia alata-maha*, also listed as *Franklinia*), gay in late summer and early fall with its large white flowers; the Sour-wood, or Sorrel-tree (*Oxydendrum arboreum*), of interest through the entire year, with its green tassels of flower buds, cream-white flowers in summer, brilliant red fall color, and tan seed-tassels through the winter; the Japanese Pagoda-tree, or Chinese Scholar-tree (*Sophora japonica*), growing into a large round-topped tree with creamy flowers and an elusive lemony

fragrance; and the Common Catalpa (*Catalpa bignonioides*), also a large tree, with very showy flowers early in the summer.

Climbing Hydrangea (*Hydrangea petiolaris*), and the Japanese Hydrangea-vine (*Schizophragma hydrangeoides*) are two similar white-flowered vines, both with excellent foliage. The feeling of weight and strength which they give harmonizes well with the weight of stonework.

White-flowered shrubs for shady areas are the Dwarf Horse-chestnut or Bottle-brush Buckeye (*Aesculus parviflora*), Sweet Azalea (*Rhododendron arborescens*), the later and longer-flowering Clammy Azalea, or White Swamp Honey-suckle (*Rhododendron viscosum*), and False Spirea (*Sorbaria arborca*), with its graceful plumes. Two white perennials useful in shade are the Fragrant Plantain-lily (*Hosta plantaginica*, often listed as *Funkia subcordata*), and the long-lived, rich-foliaged Gas-plant (*Dic-tamnus albus*).

White-flowered shrubs for sunny parts of the garden include the Sweet Pepper-bush (*Clethra alnifolia*); *Spiraea cham-aedryfolia*, one of the most graceful of the summer-flowering Spireas; a Heather (*Calluna vulgaris alba*), 8 inches tall, and thickly covered with little upright spikes of white; the lovely white-flowered Butterfly-bushes White Bouquet and Peace (varieties of *Buddleia Davidii*); and Yuccas in all their magnificence.

Lavender

Lavender or purple flowers are useful near pale gray or blue-foliaged plants, as well as with white and pink flowers. The Atlas Cedar (*Cedrus atlantica* var. *glauca*), with its new summer growth, is one of the best summer blues. With it varieties of the lavender-flowered Rose-of-Sharon (*Hibiscus syriacus*) might be



McFarland photo

Climbing Hydrangea (*Hydrangea petiolaris*)

used; or the lavender-pink *Elsholtzia Stauntonii*; the Butterfly-bush Hartweg (*Buddleia Davidii*); the deep blue Blue-beard (*Caryopteris incana*), or Chaste-tree (*Vitex Agnus-castus*); with clumps of the lavender Narrow-leaved Plantain-lily (*Hosta lancifolia*, also listed as *Funkia* or *Hosta japonica*), and a sweep of Lavender (*Lavandula officinalis* or *vera*). The deep purple of Clematis The President or Lady Betty Balfour enriches and gives depth to such combinations. The Bush-clover (*Lespedeza Maximowiczii*, or *Lespedeza Buergeri* var. *praecox*) offers an unusual and pleasing combination of lavender and pink. Touches of the gray-white Silver King Artemisia (*Artemisia albula*) make a picture suggestive of fairyland.

Pink

Dusty summer pinks are good with white or deep purple-blue. The Silk-tree (*Albizia Julibrissin* var. *rosea*), hardy as far north as New York City, is a small tree with Mimosa-like flowers and wide-spreading branches of feathery lightness. The Plume-poppy (*Macleaya cordata*, long known as *Bocconia*), though a weedy perennial, adds a great deal of beauty in late summer with its pink and bronze. Joe-Pye Weed (*Eupatorium maculatum*), a lusty perennial with large soft heads of dusty pink, is lovely with the violet-blue of *Veronica maritima* var. *subsessilis* and the dark foliage of the Chinese Elm (*Ulmus parvifolia*). Clear pinks may be found in the Tamarisk (*Tamarix pentandra*), the long-flowered Glossy Abelia (*Abelia grandiflora*), Rose-of-Sharon in variety, or the clear pink form of Indigo (*Indigofera Kirilowii*).

Yellow

Yellow may not seem like a cool summer color, but with dark greens it can be refreshing. The light-foliaged small Goldenrain-tree (*Koeleruteria paniculata*), with its sweeping yellow flowers, goes well with the depths of black-green

of Yews. Pale yellow Day-lilies, and the graceful, very exquisite small-flowered *Clematis pseudoflammula* are good choices. These yellows are good also with white.

Dark Green

In summer dark green plants and plants holding deep shadows make one feel cooler. Examples are the Nikko Fir (*Abies homolepis*); the Oriental Hornbeam (*Carpinus orientalis*); American Holly (*Ilex opaca*); Regels Privet (*Ligustrum obtusifolium* var. *Regelianum*); the Round-leaf Japanese Privet (*Ligustrum japonicum* var. *rotundifolium*); and the Trifoliate-orange (*Poncirus trifoliata*), which is hardy as far north as Philadelphia.

Lightness

Light graceful plants of not too definite habit, yet with personality, give a sense of airiness and thus of coolness. Possibilities are the Russian-olive (*Elaeagnus angustifolia*), Honey-locust (*Gleditsia triacanthos*), *Fontanesia Fortunei*, and Bamboos.

Fruit

Some of the spring-flowering shrubs have their fruits ripe and colorful by summer. Such plants, with two seasons of interest, are doubly useful. A few of the summer-fruiting shrubs are: Gumi (*Elaeagnus multiflora*), with large tawny-red pendulous fruit; Mountain-ash (*Sorbus discolor*), with interesting flat heads of yellow fruit turning white in the fall; the red-fruited Tatarian Honeysuckle (*Lonicera tatarica*), and its variety *lutea* with showy soft orange berries; and *Viburnum tomentosum*, whose fruit seems to cover the horizontal branches with a film of red.

With this variety of woody plants from which to choose, one may have color and interest throughout the summer with a minimum of work. Select plants that give a definite feeling of coolness by their color, their shadows, and their grace.



M. E. Land 1

Gas plant (*Dictamnus albus*)

SUMMER CUTTINGS

Practical for the amateur

John Tonkin

DURING the summer months, when the growing tissues of plants are in an active condition, softwood cuttings can be made of many shrubs and herbaceous plants. Obtaining new plants of Geranium, Coleus, and Tradescantia from slips is a trick that has been practiced by many generations of housewives. In addition to these, many hardy perennials, tender plants, and shrubs can be grown from softwood cuttings—often rooted in a glass of water on the kitchen window sill. In the case of many of the shrubs commonly rooted from hardwood cuttings taken in winter, a considerably higher proportion will root from soft than from hard wood.

Location and Rooting Mediums

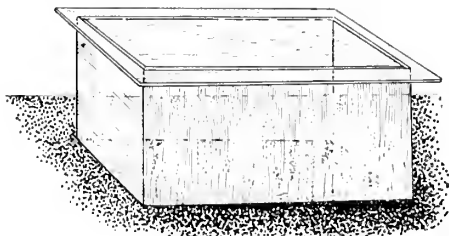
A cold frame makes a convenient place for growing softwood cuttings; but if none is available, a simple small glass frame can easily be made. It is necessary to have only five pieces of glass, four of which will form the sides of the frame, while the fifth must be of a size that will completely cover the top of it. Thick glass, of course, is more durable. A convenient size for such a little frame is 18 × 24 inches and about 12 inches high. Cuttings can also be rooted under

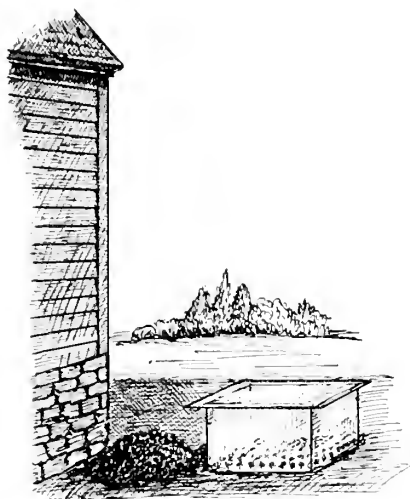
a glass jar—another method well known to garden-minded housewives.

The location for rooting cuttings should be shaded from direct sunlight, but should receive good indirect light. The north side of a building is often a good situation if there is plenty of light coming from the other directions. Sometimes a spot can be found that is shaded by a tree with high branches, but has light coming in from all sides underneath.

Sand makes an excellent rooting medium, as it is usually free from the fungi that cause the damping-off disease or decay of the cuttings. Washed sand of medium coarseness can be used in the cold frame, or in a scooped-out place if the small glass frame is to be used.

In a shaded spot, soil has been removed and replaced by a rooting medium for cuttings





Cuttings in place, covered by glass case

About 4 to 6 inches of depth is enough. Instead of sand, a building insulation material known as vermiculite (or "house-fill") is now being commonly used for rooting cuttings. It is light and fluffy, yet retains moisture so well that additional watering is seldom necessary once the cuttings have been thoroughly soaked into place. A one-to-one mixture of sand and granulated peat-moss may be preferable to sand alone for acid-soil plants such as Azalea or Holly.

Importance of Timing

The time of taking the cuttings is very important with many species. It is hard to explain exactly when this should be, as it depends on the condition of the plant tissues where the cut is to be made; and the condition of the tissues depends on the type of growth the particular plant makes. Plants such as Geraniums, which are rather juicy, are in the cutting stage when the new growth snaps readily. Shoots of woody shrubs such as Lilacs, Mock-orange, and Azalea are not so brittle; they are pliable, not stiff. The new growth should be almost completed, but the hardening of the tissues should

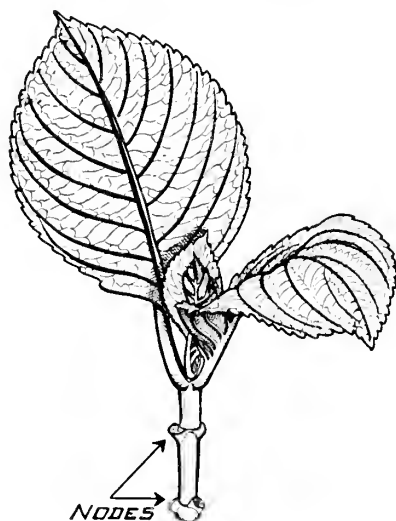
be only slightly advanced. With flowering shrubs and perennials, this will be in late spring or early summer, from mid-June to early July. With tender plants, which are making new growth over a longer period, there is more margin.

Experience teaches the best time according to the feel of the plant. Inexperienced gardeners may learn much by making cuttings from the same plant at different times, taking care to notice the condition of the wood and which set of cuttings gives the best results.

Making and Planting the Cuttings

The cut should be made with a sharp knife across the stem just below a node. For flowering shrubs a cutting is usually about 4 inches long, although the actual length depends very much upon the kind of growth the plant makes. Leaves on the lower inch of the cutting are removed, but at least three or four good leaves (many more if they are small) should be left on the upper part. In *Hydrangea* the leaves are large and far apart, and so the cutting may have to be

Hydrangea cutting, with lower leaves removed, ready to plant



fairly long. For herbaceous plants 2 inches may be long enough. The leaves are stripped from the lower part of the cutting, and any flowers or flower buds removed.



Viola cutting, with lower leaves stripped off, ready for planting

Most cuttings are kept covered with a damp cloth until they are planted; but cuttings of soft-wooded plants such as Geraniums are sometimes allowed to dry for a few hours before planting. The upper leaves are left on, to supply food for the cutting during rooting. The cuttings are placed in holes made in the sand with a small stick or dibble, and the sand firmed gently about them. They should be placed about an inch deep—more or less, according to their size. They are best spaced fairly closely together, perhaps an inch or so apart, so that they will keep each other from drying out. The leaves need light, however; and so the cuttings should not be crowded unduly. They should be watered thoroughly and covered with the glass.

Rooting Aids

While cuttings have grown for many years without the use of root-inducing chemicals (hormones), these preparations are so easy to use that it seems

only sensible to take advantage of whatever help they may give. The powder preparations can now be obtained from any good florist or hardware store. Directions for use come on the packages, and should be followed closely. The soil temperature must be at least 65° to 70° F. for these root hormones to be effective, and they are not equally effective on all species.

Care of Cuttings

The aftercare of cuttings consists chiefly in watching the moisture. If the cuttings are in the small glass box suggested, the top glass can be turned every day to allow the condensed moisture to evaporate. If the cuttings are in a cold frame, the sash top should be lifted for a few minutes each morning to allow excess moisture to escape. If there is little moisture present, however, and the tops of the cuttings seem to be quite dry, they should be lightly sprinkled. The sand or vermiculite should have a very thorough watering whenever it shows signs of becoming dry. If bright midday sunlight strikes the cuttings, it causes a scalding effect by warming them too rapidly. If the frame is so situated that this might happen, be sure to shade the cuttings with newspapers or a cloth.

The length of time required for rooting varies. Geraniums root in about three weeks. Yew (*Taxus*) cuttings, taken in late summer, will usually carry over until spring before they root. They will merely form calluses over the cut ends in the fall or late summer.

An aquarium with a glass cover can be used for starting cuttings in the house in winter: the atmosphere of most modern rooms is too dry for success with any but the easiest plants.

Propagation by cuttings is an excellent means of increasing a particular variety of plants that will not come true from seed. Care must be taken to use wood only from plants in vigorous condition and free from pests and disease.

Plants to Propagate by Cuttings

Following is a list of some of the most popular plants which can be grown from cuttings by amateurs, with the proper time indicated, and other hints.

Easy

Perennials and House Plants

Ageratum	May or later
Aster (perennial)	Named garden forms can be grown from cuttings taken early in the year.
Begonia	June to August—or whenever young shoots can be procured
Candytuft (<i>Iberis</i>)	Midsummer
Cerastium	May to August
Coleus	June to August
Geranium (<i>Pelargonium</i>)	May to August
Phlox	Dwarf types in June or July, border Phloxes when young shoots are 4 to 6 inches tall
Pink (<i>Diaanthus</i>)	May or June
Rock-cress (<i>Arabis</i>)	May or June
Spiderwort (<i>Tradescantia</i>)	June to August

Vines

Euonymus (climbing)	June to August
Ivy (<i>Hedera</i>)	June to August

Trees and Shrubs

Azalea (evergreen)	Early July; vermiculite or sand and peat
Beauty-berry (<i>Callicarpa</i>)	June to July
Box (<i>Buxus</i>)	July or later
Butterfly-bush (<i>Buddleia</i>)	June to July
Deutzia	Late May to June
Dogwood (<i>Cornus</i>), shrubby	Late June
Fuchsia	May, June, or later
Honeysuckle (<i>Lonicera</i>)	June to July
Hydrangea	June to July
Privet (<i>Ligustrum</i>)	July to August
Spirea	June to July; very easy to root
Symphoricarpos	June to August
Weigela	June or later

Medium

Perennials and House Plants

Dahlia	Take cuttings when shoots are 6 inches high.
Heliotrope	May to June
Heuchera	Summer. Use single leaves, inserting the leaf stalk, with a piece of the stem attached, in sand.

Lantana	May to June
Petunia	Cuttings can be made in late season for overwintering indoors and planting the following year.

Trees and Shrubs

Almond, Flowering (<i>Prunus glandulosa</i>)	July. Cut at base of current season's wood and place in mixture of sand and peat.
Barberry (<i>Berberis</i>)	Evergreen and deciduous, late June
Cotoneaster	July, when the young wood is ripening
Firethorn (<i>Pyracantha</i>)	July or later. Remove thorns and treat with growth substance (hormone).
Heather (<i>Calluna</i>)	June to July. Use vermiculite or sand and peat.
Holly (<i>Ilex</i>), evergreen	July to August, in sand, peat, or vermiculite
Leucothoe	Late June or early July; better in sand and peat
Mock-orange (<i>Philadelphus</i>)	June to July
Neillia	June and July
Pieris	Early July; better in vermiculite or sand and peat
Rose	July, August
Viburnum	June to July. Use hormone and a sand and peat mixture.
Winter Hazel (<i>Corylopsis</i>)	Late spring, while shoots are still growing
Yew (<i>Taxus</i>)	July. Rooting is often better when cuttings are taken in late fall or winter.

Difficult

Lemon-verbena (<i>Lippia citriodora</i>)	Early spring
Blueberry (<i>Vaccinium</i>)	June to July. Cut at base of current season's growth, treat with growth substance, and set deep in mixture of sand and peat.
Daphne	June to July. The variety Somerset roots fairly readily in a mixture of sand and peat.
Lilac (<i>Syringa</i>)	Late May, early June. Use intact shoots, cutting below current season's growth.
Magnolia	Early July. Small-leaved varieties can be rooted with fair success, using hormone treatment.
Wisteria	July. Treatment with a growth substance is necessary.

Not Recommended

Azalea (deciduous)
Ilex (deciduous)

SUMMER PRUNING

How, why, and when—for best results

George H. Gillies

THE definition of the word pruning as given in encyclopedias is "the methodical removal of parts of the plant with the object of improving the plant for the purpose of the cultivator."

If this definition were more generally known, it might curb the activities of the man with the shears who emerges each spring and shortens the growth on all shrubs indiscriminately until each resembles a shorn lamb. Such cutting is quite out of place in the shrubbery border. The majority of our flowering shrubs bloom on the previous season's growth; to shorten this growth in the spring merely deprives the owner of a wealth of bloom in early spring and summer, and robs the plant of all grace and form.

With the exception of those species which flower on the new wood of the season, the proper time to prune flowering shrubs is immediately after they have finished blooming. Obviously, if this schedule is followed, there is pruning to be done from April till July. Seldom is it given to any gardener to be able to do all operations on schedule; but the success of next season's bloom depends on pruning as soon as possible after the flowering period.

If this is done, the plant will have time, during the remainder of the season, to complete its growth and form the all-important flower buds.

Prune in summer by removing all dead wood and unsightly branches. If it is desirable to reduce the height of the shrub, this is the time to shorten growths. Good examples of this are the Lilacs, which have a tendency to grow too tall for their location; if cut back hard in mid-June,



Dormant appearance of Forsythia bush that was not pruned after flowering

they respond by throwing up strong young shoots which provide ample blossom in the following May.

Exceptions

Exceptions must be made of those shrubs which flower on the current season's growth. Examples of this are the Butterfly-bush (*Buddleia Davidii* and varieties) and *Hydrangea paniculata*. The pruning of these may safely be done in early spring. At that time all stems on *Buddleia* may be cut back to within a foot of the ground. This encourages the growth of strong shoots from the base of

Forsythia bush pruned the previous summer





Butterfly-bush pruned in early spring

the plant, on which a wealth of bloom appears in August.

Hydrangea paniculata var. *grandiflora* (or Peegee Hydrangea, as it has unfortunately been christened) makes a large shrub or small tree. When it is pruned in early spring, all the previous season's growths may be cut back to the two basal buds or eyes. On this shrub the man who mutilates with the shears can really enjoy himself; for, when it is pruned properly, this *Hydrangea* is a shorn subject and not a thing of beauty. It soon recovers, however, and rewards the heavy

pruner with a wealth of strong shoots and a fine flower truss on each shoot in August.

Selective Thinning

When a neglected and badly overgrown shrubby border must be brought back to beauty and productivity, it is well to spread the pruning operation over two seasons. Selective thinning should be the order in this operation. First remove all dead branches, cutting them out at the base of the plant. Next cut out all branches which cross or rub each other; then remove some of the older branches, with a view to restoring the shape required. In the removal of these it is best not to be too drastic, but to leave a few to be cut out the next year. Too severe pruning on an old shrub may result in the loss of the plant. In this selective thinning operation all branches are cut as close to the base of the plant as possible.

The flowering Crab Apples and Cherries must be exceptions to the summer pruning. These may be treated as fruit trees, and pruned successfully in the winter season.

Selective thinning insures a graceful shrub of good form. If the word thinning could be substituted for the word pruning, there would be less mutilation by the man with the shears.

SUMMER-HYACINTH

The Giant Summer-hyacinth (*Galtonia candicans*, sometimes called *Hyacinthus candicans*) is an attractive but little-known summer-flowering South African bulb useful for the flower border. [See color plate.] It sends up a flower stalk 3 to 5 feet high, bearing many creamy drooping bells. Summer-hyacinths are good accent plants, especially when used in groups.

The bulbs are planted in the spring, about 6 inches deep in good rich soil in full sun. In the fall they are dug for winter storage, as the Summer-hyacinth is not thoroughly winter-hardy in the vicinity of New York. The old bulbs do not bloom well again; but the offsets, planted the next year, will give bloom the second summer.

LIFTING AND DIVIDING NARCISSUS BULBS

Drying, cleaning, replanting

Joan Seltzer

DAFFODILS (*Narcissus*) are among the loveliest of the spring flowers. They bloom profusely, adding much color to any woodland, field, yard, or lane. Most amateurs believe that these plants continue to bloom year after year with no noticeable depreciation in the size, quantity, or quality of the bloom. Actually, the bulbs should be lifted every three years or so, or they become crowded and weak and finally cease to bloom. To be kept in the best condition, they

must be divided, and any decayed or diseased ones destroyed.

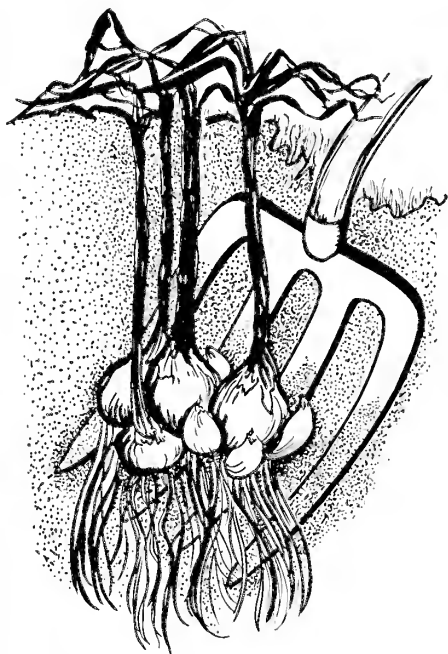
The bulbs should be lifted only after the foliage has ripened—late in June in temperate climates. The foliage first becomes yellow or brown, and then dies; it should be allowed to remain attached to the bulb until it falls off naturally, because the bulb gains its strength from the foliage.

The equipment used for lifting *Narcissus* bulbs consists of flat trays and a digging fork. If the varieties have been planted separately, each clump may be tagged. The fork is inserted into the ground, well below the clump, so that the bulbs will not be damaged when they are lifted. The excess soil is carefully shaken from the bulbs before they are put into the flats.

The bulbs should be spread out as thinly as possible on a dry floor or table in a cool place free from dampness, so that they will dry as quickly as possible. They must not be allowed to lie in heaps, as the moisture and heat will cause them to rot and mildew. When the bulbs are dry, the soil is rubbed from them—carefully, so that their bases are not damaged. Bulbs should be allowed to divide naturally; they should not be cut apart by amateurs, even though the smaller bulbs and bulblets seem to be only very loosely attached to the main or mother bulb.

When cleaning the bulbs, the amateur is advised to watch particularly for basal rot, which shows on the disk on the bottom of the bulb. Basal rot prevents the formation of good roots. *Narcissus* flies may infest the bulbs and eventually destroy them. Diseased and decayed bulbs must be burned—not merely placed in the dump heap or thrown away.

Method of lifting *Narcissus* bulbs





Narcissus bulb with bulblets

Before replanting bulbs, commercial growers often dip them in a formaldehyde or a mercuric chloride solution, as a precaution against basal rot. Few amateurs are equipped to do this, or to attempt the complicated hot water treatment (110° F. for about three hours) which is used to kill such pests as Narcissus flies and eelworms.

The bulbs may be replanted any time the ground is ready for them. July and August are ideal times. It is neither necessary, nor beneficial to the bulbs, to wait until autumn.

If large quantities of Narcissi are grown, a few can be lifted each year; this is easier than taking up the whole collection at one time. The procedure of lifting and replanting is simple, and is justified by the ensuing strong growth and finer flowers.

TUBEROSE

The name is Tuber-ose, not Tube-rose; it is the "Tuberous Hyacinth," as distinguished from the bulbous Hyacinth.

The Tuberose (*Polianthes tuberosa*) is a Mexican plant. It was taken to France as early as 1530, and a double variety was raised in Holland several centuries later. For many years it was an important crop in southern Europe and extremely popular both in Europe and America.

During the present century, however, it has lost much of its popularity, probably on account of a too strong scent. A few bulbs of it are desirable in the garden, however. They should be planted late in the spring after the ground has warmed up. They flower in the mid-summer heat when many other plants have ceased to bloom.

The bulbs should be dug in the autumn and stored in a warm place over the winter.

McFarland photo



NEW KINDS OF PLANTS BY CHEMICAL TREATMENT¹

*Anyone can try it—with patience
and care*

Betty F. Thomson

PLANTS are what they are both because of the environment they live in and because of what they inherit from their forebears. Watering, fertilizing, choosing a sunny spot for them to grow in, are ways by which we attempt to improve the environment. Nasturtiums can be induced to go all to leaf by means of an excess of nitrogen; and Hydrangeas can be induced to bloom either blue or pink, with the right chemical in the soil. But an Oak tree cannot be turned into an Elm, nor even Bush Beans into Pole Beans, by any known means. Such limits of what environment will do to a plant are determined by the plant's hereditary make-up, and this in turn is determined by the *chromosomes* that the plant contains in each of its cells. Any change in the chromosomes of an individual is passed on to its offspring and on down through its progeny.

The chief occupation of plant breeders is maneuvering to recombine chromosomes by crossing one kind of plant with another until as many desired traits as possible appear in a single individual. (See Elizabeth Marcy's article on hybridizing plants in the spring 1947 issue of PLANTS & GARDENS.) X-rays and the emanations from radioactive materials can cause actual inheritable changes (or *mutations*, as they are called) of the individual determiners (or *genes*) located in the chromosomes. Most mutations so

produced are small changes that are of more interest to the laboratory scientist than to the flower or fruit grower.

Another kind of inheritable change is a complete doubling or even quadrupling of the entire chromosome set within each cell of a plant.²

The chromosomes in an ordinary plant occur in pairs, one of each pair being derived from the male parent, the other from the female parent. Such plants are described as "diploid." Some plants have been found to have not just two, but four, six, or even eight of each kind of chromosome. These are called tetraploids, or hexaploids, or octoploids, respectively—or all lumped together as polyploids. What causes such chromosome multiplication in nature we do not know; for want of any specific information we say that it happens spontaneously. Geneticists and plant breeders would very much like to be able to make this change themselves by a simple and reliable means.

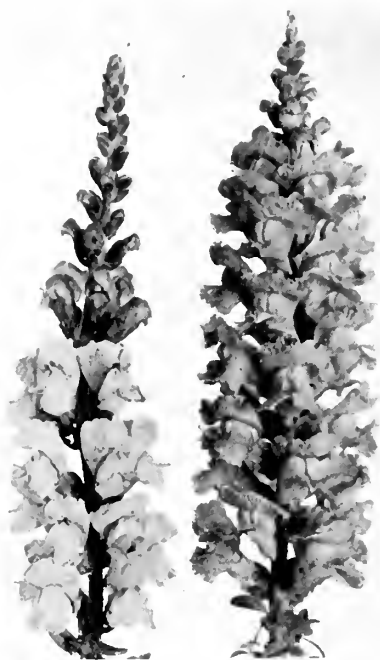
Enter Colchicine

In 1937 a considerable amount of excitement was aroused in the botanical world by the discovery that the drug colchicine causes just such a doubling of chromosomes. Colchicine is an alkaloid found in the seeds and corms of the Autumn-crocus (*Colchicum autumnale*). It has been known for centuries as a poison, and in minute quantities, as a specific remedy for gout. Here, then, is a chemical (available at the corner drugstore) which, when applied by relatively simple means, causes definite inheritable changes in the treated plants.

Doubling the number of its chromosomes has a characteristic effect on the

¹Adapted from "Hormones and Horticulture," by George S. Avery, Jr., Betty F. Thomson, and others, published by McGraw-Hill Book Co., Inc., New York, 1947. 326 pages. \$4.50.

²A Crocus may have as few as 6 chromosomes, an Australian Water-lily, as many as 224; Poison-ivy has 30, Chinese Ash, 138.



Photos from "*Hormones and Horticulture*"

Snapdragon flower clusters: left, diploid; right, tetraploid

appearance of a plant. In general, the resulting plants are stockier and have thicker stems, broader, thicker, and darker green leaves, and larger flowers, fruits, and seeds. Growth is usually somewhat slower, and flowering and ripening of fruit may take longer. Several of these changes from the usual diploid plant are just what the flower grower wants; and the seedsmen have been at work with this new tool for some time. Seeds of several colchicine-induced tetraploid plants can now be bought from growers: for example, Marigolds, Snapdragons, and Annual Phlox. No doubt others will also be offered for sale in the future.

How Colchicine Works

How does colchicine bring about this remarkable effect? When a cell begins to divide in the course of the growth of a plant, the first preparatory step is a

lengthwise splitting of each of its chromosomes into two "daughter chromosomes." Then, by a fairly complicated process (called *mitosis*), the chromosomes are sorted into two groups, each group containing one from each pair of daughter chromosomes. Between the two groups a new cell wall forms, and in the end there are two new cells, both alike and both just like the parent cell from which they were formed.

Colchicine does not interfere with the preliminary stages when the chromosomes split in two; but it does stall the machinery that sorts them into two groups and separates them with a cell wall. When the cell recovers from this temporary poisoning, it has twice as many chromosomes as it had before, but is otherwise none the worse for the experience. All cells derived from the doubled ones, as the plant continues to grow, will likewise have twice the usual set of chromosomes, that is, they will be tetraploid instead of diploid.

Marigolds: above, tetraploid; below, diploid



Ways to Apply Colchicine to Plants

Since colchicine affects only cells that are in the process of dividing, it is effective only on parts of the plant that contain many dividing cells, that is, parts that are actively growing. Two places in plants where growth goes on rapidly are in germinating seeds and in young growing stem tips (or expanding buds); these, then, are the places to direct the colchicine treatment.

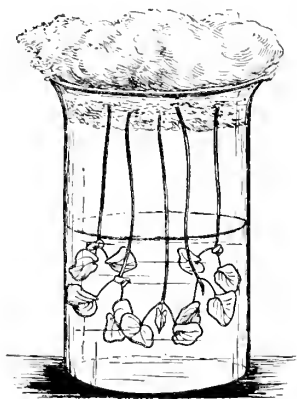
Seed treatment is the simplest, though perhaps not the most effective, way of using colchicine. Seeds can be soaked for a day or so in a water solution of the drug, then planted as usual.

Better results are usually obtained by treating growing buds of either seedlings or older plants. Various ways can be devised to keep a bud or stem tip moistened with colchicine solution for a period of hours or days. It is better not to expose the roots to the solution, as it stunts or even kills them.

Seedlings can be rolled in little bundles, with the roots wrapped in moist cotton or paper, and the tops immersed in the colchicine solution. See illustration. Or seeds may be planted in soil and seedlings treated as soon as they appear. The solution can be dropped on bits of ab-

Method of immersing tops of seedlings in colchicine

Drawing from "Hormones and Horticulture"



Drawing from "Hormones and Horticulture"

Colchicine jelly applied to growing tip of plant in a capsule

sorbent cotton wedged carefully between the youngest leaves, in close contact with the very tip of the stem. The solution can also be made into a soft jelly by adding about 1 per cent of gelatin or agar; this jelly can be placed in half of a large drug capsule, and the capsule pushed over the growing stem tip like a little hat. See illustration.

Dr. Haig Dermen of the United States Department of Agriculture recommends the following procedure for young seedlings: as soon as the seed leaves separate above the ground, or the shoot tips are up $\frac{1}{2}$ inch above the soil level, a small drop of the solution may be placed on the growing stem tip by means of a toothpick or medicine dropper. The drop of solution should not be allowed to run off. Before and after treatment the seedlings should be shaded (with newspaper, for example). The shading at germination time is to make the seedlings grow rapidly; the shading after treatment is to prevent rapid evaporation of the solution, and to prevent injury from the sun's rays.³

Bulbs, or any plant in which the stem tip is covered over with many overlapping leaves, can be treated by means of a hy-

³ Correspondence with Dr. Dermen.

podermic needle; or a small core of tissue may be removed, and an eyedropper used to fill the cavity with colchicine solution.

For applying colchicine to the growing tips of woody plants (such as young fruit trees), Dr. Dermen's directions are: plant 1-year-old trees singly in soil in 12-inch pots between mid-January and early February. Cut each plant back to a bud 2 feet above the soil level, and place them under conditions favoring rapid growth.

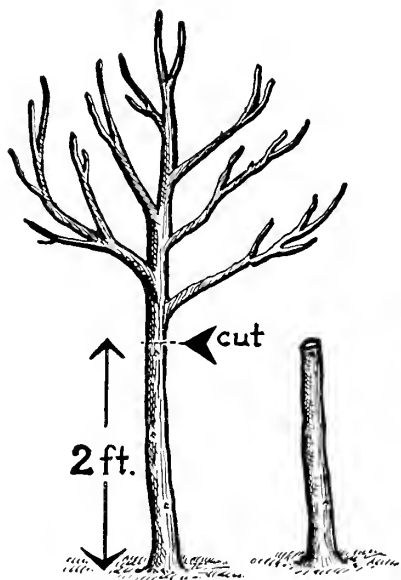
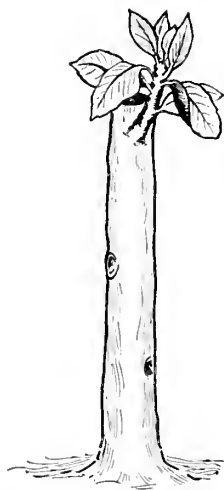


Diagram of a year-old fruit tree: left, ready to be cut above bud 2 feet from ground; right, after removal of top

Allow the topmost shoot on the cut-back tree to grow to a length of about 5 inches, removing other growths below that shoot. When such a shoot has grown, break off the young leaves near its tip, and with a sharp blade cut off the very young leaves that cover the terminal growing point. If the growing point is accidentally cut, the tip can still be used. Shade each prepared tip with a flat piece of non-absorbent cotton. The following day uncover the tip, and (with a medicine drop-



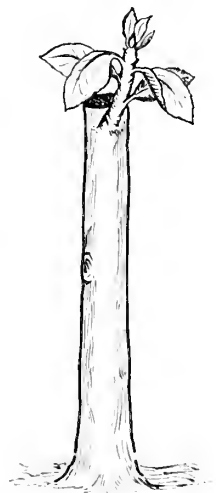
Two-foot stump of year-old fruit tree, drawn to a larger scale. Uppermost shoot about 5 inches long; other growth removed

per) apply enough colchicine solution to saturate the shoot tip, then replace the cotton.¹ See illustrations.

The solution recommended for treatment of woody plants consists of 1 per cent of colchicine in 20 per cent glycerine-

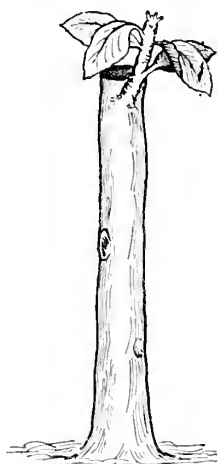
¹ Dermen, H. Polyploid pears. *Journal of Heredity*, vol. 38, pp. 189-192, 1947.

Young leaves, near tip, removed



water;⁵ to each scant tablespoonful (10 cubic centimeters) add 2 drops of Santomerse (a wetting agent to make the liquid spread over the stem tip and penetrate the crevices). The cotton should be left over the tips until the new growth lifts it off.

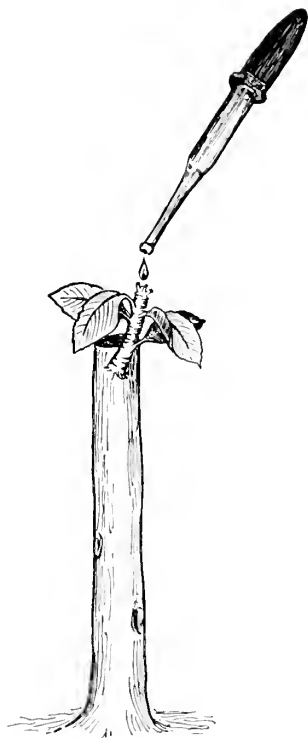
Seedlings of such soft-tissued garden plants as Marigolds, Snapdragons, etc., may be treated with 0.5, 0.2, 0.1, or 0.05 per cent solution in water or in 20 per cent glycerine-water (see footnote 5), plus Santomerse. One might try a series of these various per cents, each applied



Very young leaves removed from terminal growing point

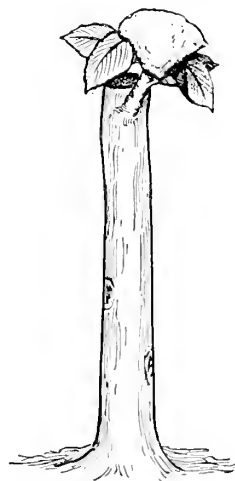
for four, six, and twenty-four hours—twelve lots in all. In general, treatment that is severe enough to be effective will kill a certain percentage of treated plants; that is to say, the difference between effective treatment and fatal treatment is not very great.

⁵ Made up as follows: water, 80 parts, glycerine, 20 parts, colchicine, 1 part. Ask your druggist to make up the colchicine mixture. If for any reason he is unable to do it for you, write to the Brooklyn Botanic Garden for assistance.—Ed.



Above: colchicine applied with medicine dropper

Below: tip of branch covered with nonabsorbent cotton



First Effects of Colchicine Treatment

If the colchicine treatment is effective, the surviving plants stop growing for a period of days or even weeks. When growth begins again, the first new parts to appear are likely to be distorted and malformed. This is because colchicine does not affect all cells equally: some may be unaffected, while others near-by are greatly changed. Such variously affected cells may be mixed together quite at random.

As growth continues, however, the mixed tissue is usually left behind, and relatively homogeneous branches appear. Some of these branches may be tetraploid. These can usually be recognized by their larger leaves, thicker stems, and larger flowers. Sometimes it is necessary to resort to microscopic examination of pollen grains and of the tiny pores (*stomata*) on the undersides of leaves. However, such obscure signs of tetraploidy are likely to be of more interest to the laboratory scientist than to the person who merely wants handsomer plants.

Obtaining Entirely Tetraploid Plants

Having obtained a tetraploid branch, how does one proceed to get a whole plant from which to propagate a new stock? If an entirely tetraploid branch appears, the end of it may be removed and rooted in sand. Many kinds of plants not usually propagated from cuttings will nevertheless root quite readily. (See the article on summer cuttings, by John Tonkin, in this issue; and the one on the rooting of cuttings, by Elizabeth Bindloss Johnson, in the autumn 1945 issue.) Sometimes a branch appears which bears some ordinary and some larger, presumably tetraploid, leaves. Cutting off the end of the stem just beyond one of these larger leaves will usually force the bud just above the leaf to grow into a side branch; this side branch will probably

be all tetraploid, and can be cut off and rooted to produce a new plant.

If flowers appear on a tetraploid branch, and seeds are finally formed, the seeds will grow into tetraploid plants—provided, of course, either that the flower is self-pollinated or that the pollen comes from another tetraploid flower.

If tetraploid and unaffected diploid tissues are too much mixed up in a treated plant, it is almost impossible to get an entirely tetraploid individual from it; and it will save time to start again and treat a new lot of plants.

Characteristics of Tetraploid Plants

The general appearance of tetraploids has already been mentioned—stockier stature; larger leaves; and larger flowers, fruits, and seeds. In a number of cases commercially important substances are found in larger amounts in colchicine-produced tetraploids than in the diploids from which they were derived. For instance, tetraploid Sugar Beets contain more sugar per beet than the corresponding diploids; the same is true of rubber in Russian Dandelions, atropine in the leaves of Jimson-weed, and nicotine in Tobacco. Such an increased yield per plant results in an increase per acre, and hence a greater return for a given expenditure of time, labor, and space.

The fibers of tetraploid Cotton and Jute are larger than those of diploids, although it is not reported whether these larger fibers are of comparable or superior quality. The accompanying figures show the difference between tetraploid and diploid flowers of Marigold and Snapdragon.

Colchicine-produced tetraploids (or other polyploids) may be useful to the plant breeder for reasons other than their own particular merits. They may have good qualities that can be bred into existing lines (either wild or cultivated) of the same degree of polyploidy. For example, drought-resistant or disease-resistant wild polyploids of Cotton, Tobacco, and Delphinium have been crossed with

cultivated polyploid strains in an effort to add resistance to their other desirable characters.

One very important contribution of colchicine is that doubling the chromosomes of a sterile hybrid often makes it fully fertile. On the other hand, it is not fully understood why doubling the chromosomes of plants that are *not* hybrids sharply reduces their fertility. This is a decided disadvantage in plants that are raised primarily for their seeds, as are all of the cereal crops, for instance.

Limitations

Multiplication of chromosome number is desirable only to a certain point. The best plants seem to be tetraploids, whether colchicine-produced or naturally occurring. Experimentally produced octoploids are usually stunted and completely sterile, with thick, ungainly stems, and coarse, wrinkled leaves. Another factor to consider is that many of our best cultivated plants, as well as a num-

ber of wild ones, are already naturally tetraploid, or even hexaploid or octoploid. The list of these includes certain varieties of such widely assorted plants as Cotton, Wheat, Oats, Potato, Gladiolus, Dahlia, Rose, and Chrysanthemum.⁶

More New Plants Wanted

In spite of these limitations, there is room for a great deal more experimental work with colchicine on the part of interested and persistent amateurs and professional plantmen. Of any large group of plants treated, perhaps most will either succumb or not be affected at all. But one would be willing to overlook a good deal of fruitless work in the excitement of producing one really new kind of plant.

⁶The wild Ox-eye Daisy has 36 chromosomes (tetraploid); cultivated Chrysanthemums may have 18, 36, 54, or 72; wild kinds of Gladiolus may have 30 (diploid), 60, 90, or 120 chromosomes; cultivated kinds are known to have 30, 60, or 90.



MOWING FLAWN

THE lawn grass known as Flawn (*Zoysia Matrella*) has been used around the housing development known as Parkchester, in the Bronx, New York City. Where the pedestrian traffic has been heavy and children have been playing, the grass has not stood up well. Some of the authorities on Flawn (who have studied the Parkchester situation) conclude that instead of giving it little mowing (as has been recommended) it

is better to keep Flawn mowed short. This tentative recommendation should interest those who have grassy areas subject to heavy use. When the Flawn grows long, and is walked on, the woody stems apparently break off—and the grass suffers correspondingly.

Readers of PLANTS & GARDENS who have had experience with Flawn lawns are invited to send comments to the Editor.

WEED KILLERS

Results of recent research

Conrad B. Link

THE control of lawn weeds is the most valuable use of 2-4-D for the average gardener, and probably will continue so for a long time to come. But reports of current research show many new trends of investigation with this and other chemicals for weed control.

Ornamental Plants

The control of weeds in nurseries is especially important in beds of newly planted seedlings or cuttings. Experimental work shows that 2-4-D, applied to the soil in dilute amounts (five times the amount recommended for lawn weeds), will kill the roots of many perennial weeds. This 2-4-D application is made at the time the soil is being prepared in the spring. The soil should be safe for planting in about sixty days. Young plants of nursery stock have been set out in treated soils without injury.

Gladiolus growers may use 2-4-D for weed control in their fields by treating the soil before planting the corms. For this purpose, 2-4-D has been used at the rate of 5 pounds per acre in light soils, and has given effective weed control. Heavier applications (of 10 to 20 pounds per acre) have retarded growth, when the corms were planted immediately; but no effect was observed when planting was delayed for three weeks. The light applications are not so effective in heavier soils.

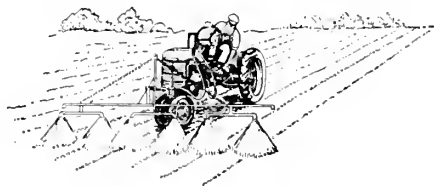
Lawns

Work is being continued with 2-4-D in lawn-weed control. One of the new findings is that Crab Grass has been reduced where 2-4-D has been applied at

three times the usual rate. The lawn must be treated early in the Crab Grass growing season, when the seedlings are young; and fertilizer application is reported as a desirable follow-up practice.

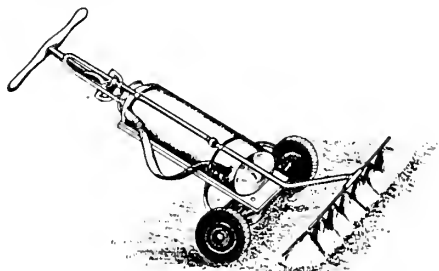
Vegetables

Weed control is one of the major items in the cost of producing vegetables. This is especially true for those that are grown in rows and are slow-growing in their earlier stages—such as Onions and Carrots. In research on weed control in vegetable gardens, the aim is to kill the weeds by treating the soil at the time it



Applying 2-4-D solution to young seedlings in field

is being prepared for planting; or to treat the weed seedlings in the early stages of growth, together with the adjacent soil. Apparently 2-4-D is most useful when applied to the soil before weed seeds germinate; other herbicides are used after both the vegetables and



Spraying 2-4-D solution by attaching tank to lawn mower

weeds have started to grow. For Carrots, Parsnips, and related plants, aromatic naphthas and other oils are used; for Peas, di-nitro compounds are effective; and sulfuric acid for Onions. These materials kill the weeds, but do not injure these particular crops. In such cases it is essential to use specific weed killers for specific crops.

Fruits

Weed killers are used less in fruit growing because of the nature of fruit-bearing plants and their cultivation. In Strawberry plantings 2-4-D may safely be used at the rate usually recommended for lawn-weed eradication (0.1 per cent); it may be applied at any time during the first growing season. In the second year 2-4-D cannot be used safely until after harvesting, because it would have harmful effects on the flowers, flower buds, and developing fruits. In addition to its weed-killing value in fruit plantings, 2-4-D has been found to reduce fruit stem dieback on Citrus fruits, and to control preharvest drop in some varieties of Apples, Grapefruits, and Oranges.

Field Crops

Experiments of the past year have shown great advance and much promise of further gains in the use of selective weed killers with field crops. Weed killers such as 2-4-D have been used with promising results on small grains, Peas, and Corn. Application at the proper time has eliminated the competing

weeds and reduced the number of cultivations necessary. Some field crops are extremely sensitive to the present weed killers, and so other methods of weed control are necessary. Cotton, for example, is very susceptible to injury by 2-4-D. Much additional research is necessary before such weed killers will be practical in general farming.

Nuisance Plants

The control of nuisance plants is important in many ways. 2-4-D is effective in killing Ragweed in unoccupied city land and waste areas; or when used in more dilute concentrations, it prevents the shedding of pollen. Poison-ivy may be killed under most conditions with 2-4-D (1 or 2 per cent), ammate, and other newer materials still unnamed. Preliminary research indicates that weed trees may be killed by spraying or painting the bark with 2-4-D in an oil emulsion. Along railroads, public utility

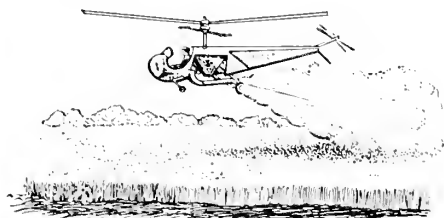


Knapsack sprayer for 2-4-D

rights of way, roadsides, and streams, 2-4-D (alone or in combination with newer chemicals) may be used for selective killing of both herbaceous perennial and woody plants. Clearing streams of aquatic plants for marine traffic, drainage, and mosquito control are possible and practical uses for these new weed killers.

These many suggestions from current research indicate a few of the promising uses to which 2-4-D and other weed-killing chemicals may be put in the near future.

Dusting with 2-4-D from airplane



WITHIN THE BROOKLYN BOTANIC GARDEN

FLOWER SHOW EXHIBIT

Hybrid Tea Rose culture was the general theme of the Brooklyn Botanic Garden exhibit at the International Flower Show in New York, March 8 to 13, 1948. The central feature of the exhibit was a small rose garden of Hybrid Tea and Floribunda Roses in bloom. This garden was separated from the rest of the exhibit on either side by a low hedge of Japanese Holly (*Ilex crenata*). A small statue, "Pamela," by Sylvia Shaw Judson, was the center of interest in the little rose garden. The background of the entire exhibit was a hedge of Arbor-vitae.

On one side of the rose garden was a demonstration of soil preparation, showing the essentials for successful rose growing—good drainage and a well-prepared fertile soil. To illustrate planting, one plant was shown in a hole with the roots spread out; then one with the hole partly filled with soil, firmed; and then a plant being watered. The care after planting showed the pruning following

setting out, and the mounding of the newly-planted roses.—Soil is temporarily hilled up around the stems to prevent drying, and is removed in three to four weeks when new top growth starts.

On the other side of the rose garden winter protection was illustrated: a mound of soil, and later, straw or other protection.—In November, before the ground freezes, a mound of soil should be made around the base of the plant to a height of 8 to 10 inches. Later, after the soil freezes, a mulch of straw, salt hay, coarse garden litter, or evergreen branches is suggested for covering.

Spring pruning was illustrated by three groups of plants; one group had been pruned severely, one moderately, and one only slightly. Severe pruning (leaving only two or three canes per plant, with three or four buds on each) produces few flowers, but with long stems. Moderate pruning (which leaves four to five stems 8 to 10 inches tall) produces many flow-

General view of exhibit





Miniature Rose garden with statue "Pamela" by Sylvia Shaw Judson.
Background of Arbor-vitae trees

ers of good quality, and is the type of pruning recommended for the average garden. Slight pruning (leaving the plant 15 to 18 inches tall) allows for the maximum flower production, and is recommended for plants intended to give a large garden display.

Several points of summer care were illustrated: summer fertilization, methods of cutting flowers, and proper watering. Roses should not lack water during the summer; when watered, they should have

a thorough soaking, not just a sprinkle. Established plants are fertilized lightly after the June flowering. When flowers are cut, a length of the flowering stem with at least two leaves should be left on the plant. Flowers which mature on the plant should be removed when the petals fall. The old flower should be cut off just above the uppermost five-leaflet leaf.

An illustrated leaflet on rose culture was distributed to the visitors at the show.

CONRAD B. LINK

FORSYTHIA DAY

The third annual celebration of Forsythia Day was held on April 5 at the Garden, with more than four hundred members and their guests attending.

Since Forsythia became publicly recognized as Brooklyn's official flower nine years ago, through the vision of Mrs. Edward C. Blum, plantings of the golden-belled shrub have become more and more widespread throughout the Borough. To encourage further plantings, the revenue from the Endowment Fund established by Mrs. Blum in January, 1946, was used this year to purchase 1,000 Forsythia plants, which were distributed among members and their guests after the formal ceremonies. An additional 100 plants, donated by Mrs. Albert Conway, were given to schools associated with the Garden's Department of Education.

Mrs. Frank E. Simmons gave fifty plants to the Borough's churches.

Mr. R. C. Jenkins, Borough Director of Parks, was the principal speaker on the program. He discussed the growing and care of Forsythia, and afterwards answered questions from the floor.

Mrs. Blum spoke of the spiritual encouragement Forsythia can give; and together with the audience recited the symbolic message: that Forsythia sends the whole world its friendly message of Brotherhood, Unity, and Understanding.

Other speakers included Mr. Leonard P. Moore, Chairman of the Botanic Garden Governing Board; Dr. George S. Avery, Jr., Director of the Garden; and Mrs. Thomas H. Roulston, President of the Woman's Auxiliary. Mrs. George H. Dayton presided at the ceremony.

MUNN MEMORIAL TREES

The Claude Harris Munn Memorial Trees, gift of Mrs. Martha S. Munn of Elma, New York, were planted this spring. Mr. Munn was very fond of trees during his lifetime; and the Botanic Garden is honored to have Mrs. Munn establish the living memorial here. She has

chosen the Sorrel-tree (*Oxydendrum arboreum*); and the planting site is adjacent to the Pines, not far from the North Washington Avenue Gate. Mrs. Munn has expressed the wish to establish an endowment fund for special care of the trees.

Claude Harris Munn, Business Analyst and resident of Elma, N. Y. Born August 23, 1892, in London, England, died February 10, 1946. Served with the British Army in World War I, and became an American citizen in 1935. World traveler, linguist, and community-minded citizen.

BOTANIC GARDEN WEEK

Brooklyn Botanic Garden Week, held this year for the first time, from May 1 to 9, attracted thousands of visitors, who came to see the Cherry blossoms or to join in the activities.

Borough President John Cashmore issued a proclamation, officially declaring the Week; and posters, newspapers, and the radio carried news of the events to every corner of the Borough, to Greater New York, and to near-by States.

From the sale of plant materials, a benefit bridge party, donations, and new memberships, money was raised to help finance long-needed resoration work on the grounds and to enable the Garden

to fill vacancies among top staff members.

Some of the events of the Week were a May Day pageant, a memorial tree planting ceremony, a flower show, a two-day school of horticulture, and a celebration of the thirty-fifth anniversary of the Children's Garden.

The Week was successful in that it induced many people who had never before seen the Garden to come and learn at first hand what is here, and to gain some appreciation of the work that is carried on. Many new friends were added to the list of those who support the Garden.

MATTHEW A. BASSITY

A CORRECTION

Of a statement in the article on Holly in Plants & Gardens, Winter, 1947, page 237.

The Reynolds Holly was discovered by Hoskins Shadow of the Tennessee Valley Nursery, Winchester, Tennessee, on the property of a Mr. Reynolds near Belvedere, Tennessee. Mr. J. C. McDaniel, Tennessee State Horticulturist, considers this the finest native Holly he has seen in the territory between Tennessee and Florida.

BROOKLYN BOTANIC GARDEN
OF
THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES

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Director of the Botanic Garden

GEORGE S. AVERY, JR.

TO VISITORS

To reach the Garden:

By Subway: from Manhattan, twenty-five to thirty minutes' ride from Times Square or Grand Central: **I.R.T., West Side** (7th Avenue or Broadway-7th Avenue line), downtown express marked "New Lots Avenue" or "Flatbush Avenue," to Eastern Parkway-Brooklyn Museum Station; **I.R.T., East Side** (Lexington Avenue line), downtown express marked "New Lots Avenue" or "Utica Avenue" or "Atlantic Avenue," to Nevins Street, step across platform and change to 7th Avenue or Broadway-7th Avenue train, ride to Eastern Parkway-Brooklyn Museum Station; **B.M.T.** Brighton Beach train to Prospect Park Station.

By Automobile: from points on Long Island take Eastern Parkway westward, and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway; follow the Parkway to Washington Avenue, then turn right.

PLANTS & GARDENS

Autumn, 1948

London's Kew Gardens

—

Cone-bearing Trees

—

Suburban Garden Design

—

Autumn Flowers

—

Bulbs

—

Dividing Peonies

—

Japanese Beetle



AMONG THE CONTRIBUTORS TO THIS ISSUE

HAROLD T. ABBOTT, Superintendent of Parks in Spokane, Washington.

EDWARD AUTEN, JR. of Princeville, Illinois, one of the largest growers of Peonies in this country.

ALBERT L. BAILY, JR., a teacher at Westtown School, Westtown, Pennsylvania, has had charge of the arboretum there.

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C. H. HADLEY, Principal Entomologist In Charge of Japanese Beetle Investigations of the United States Department of Agriculture Station at Moorestown, New Jersey.

JOHN S. KISTLER, a landscape architect of Swarthmore, Pennsylvania.

CONRAD B. LINK, formerly Horticulturist at the Brooklyn Botanic Garden, now Professor of Floriculture at the University of Maryland.

EDWARD B. LLOYD of Montclair, New Jersey, a former president of the American Dahlia Society.

CHARLES H. MUELLER of New Hope, Pennsylvania, importer of fine bulbs, and author of the book "Bulbs for Beauty."

WINTON H. REINSMITH, a member of the United States Forest Service, and a specialist in grasses for the South.

MARION T. ROWLEY (MRS. N. EVERETT) of Hanover, New Jersey, an amateur gardener particularly successful with bulbs.

SIR EDWARD SALISBURY, Director of Kew Gardens, London, England, and Biological Secretary of the Royal Society.

ROBERT SCHREINER of Salem, Oregon (formerly of St. Paul), one of the best-known commercial growers of Iris in this country.

BESS L. SHIPPY (MRS. B. L.) of Lockport, New York, formerly connected with The Barnes, East Aurora, New York, American representatives of the C. G. van Tubergen Bulb Nursery of Holland.

EDWIN F. STEFFEK, a member of the staff of the Massachusetts Horticultural Society, and Assistant Editor of Horticulture.

DOROTHY WAUGH, Director of Public Relations, Free Public Library, Montclair, New Jersey.



Euonymus Fortunei var. *vegetus*

NEW SERIES

Autumn, 1948

VOL. 4—No. 3

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Brooklyn Botanic Garden
Brooklyn 25, New York



In the Oriental Garden at the Brooklyn Botanic Garden

Except where otherwise credited, photographs by Louis Buhle

THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES
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BROOKLYN 25, NEW YORK
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Autumn 1948

Dear Readers:

A few weeks ago subscribers to PLANTS & GARDENS received a questionnaire, and as this is written, a gratifying number of replies have been received. We promised readers a report, and here it is - in preliminary form, at least.

1. To our amazement, slightly more than half those who responded favored the present four issues per year, rather than an increase to six. Many readers gave reasons, the chief one being that there isn't time to read more - and read intelligently.
2. Opinion on carrying advertising was evenly divided.
For, 37 per cent; against 36.5 per cent; no comment, 26.5 per cent.
3. In general, readers like the editorial policy and wish no change.

An overwhelming 94.5 per cent like the exhaustive treatment of a single theme as now given in two issues each year.

52 per cent desire no change in the present stress on fundamentals of gardening and horticulture.

87 per cent like the articles as they are now written.

65 per cent think there are enough "practical" articles on the care of plants, layout of gardens, etc.

60 per cent find the winter issue with its condensations helpful.

Many readers wrote thoughtful letters, and many made valuable suggestions. The response is deeply appreciated. We like to have your personal interest, because PLANTS & GARDENS belongs to you!

Well over a hundred readers have asked for seeds of the hardy Silk Tree - made available by Mr. and Mrs. Frank Bailey (see Summer issue of P. & G.). Seeds may still be obtained, and are yours for the asking.

Sincerely yours,

George S. Rosy Jr.

Director

LONDON'S KEW GARDENS

World-famous for beauty and for service

Sir Edward Salisbury

THE Royal Botanic Gardens, Kew, known popularly as Kew Gardens, occupy about 288 acres in Surrey. They are some 10 miles to the west of London, and are girdled by a bend of the River Thames.

Origin, Plan, and Purpose

The Gardens had their origin in the private gardens owned by the British Royal Family some two hundred years ago, when Princess Augusta, the mother of King George III, conceived the idea of a botanical garden in the modern sense. At first the Gardens were less than one thirtieth of their present area; but with the help of Lord Bute, the col-

View in Kew Gardens, showing the main museum in the background

Photos courtesy of British Information Services, New York



lections soon rose to international fame. It was not until 1841, however, that the Gardens were handed over to the Nation, to become the most important taxonomic institution in the world—that is, an institution devoted to the study of the classification of plants. While primarily serving scientific ends, these Gardens are now also one of the most favored resorts of the British garden-minded public of today.

The first Director of Kew, Sir William Hooker, soon obtained the much-needed extensions; it was at this period that the Palm House, some 60 feet high and 360 feet in length, was erected; and also the Temperate House, perhaps the largest glasshouse in the world. Today the living collections of trees, shrubberies, herbaceous plants, rock garden plants, and plants in the numerous houses comprise some forty-five thousand kinds, representative of almost every clime and region of the earth's surface. They furnish material for research; and while grown mainly for their scientific value, these plants create that diversity of interest and aesthetic appeal that attracts so many visitors each year to the Gardens. Of the million and a half who came to Kew Gardens during the past year, many were from overseas; and it is indeed a meeting place for those of all nations to whom matters of botanical or horticultural interest appeal.

For many, of course, Kew's attraction is mainly aesthetic; and these find *Magnolia* time in spring, *Rhododendron* time in summer, and the brilliant tints of autumn the "high spots" in a succession of beauties. Though the living plants are placed mostly according to their natural groups [families, etc.], particularly is this so in the herbaceous beds; yet this is not incompatible with artistic arrangement. In the glasshouses and in the open also, as indeed in the aquatic garden, the rock garden, and the chalk garden, plants are grouped together according to their special cultural require-

ments; this helps them to grow more easily, and reduces the amount of labor that a strictly taxonomic arrangement* would entail. In this way too, visitors find in the living collections an appeal to their horticultural as well as to their botanical interests.

Research Facilities and Services

In the large herbarium building at Kew there are housed millions of dried specimens from all over the world. Specimens from the British Commonwealth are particularly well represented; and what is far more important than the vastness of these collections is their unparalleled richness in type specimens.† An extremely rich collection of botanical works is also housed in the herbarium; and so in this building (which has been enlarged three times) there is provided an instrument for the investigation of plant classification that is unique both as to its magnitude and as to its efficiency. In this building work a staff of specialists who not only deal with the numerous daily inquiries concerning the identification of plants, but have prepared the magnificent array of floras,‡ such as those of India, tropical Africa, South Africa, and Australia (to mention but a few), which have so much helped the progress of botanical science overseas.

Since no effective use can be made of work done on plants unless they can be accurately named, identification is an international service that Kew tries to provide; but the limited staff is all too small to cope with the increasing demands made upon them. It would facilitate this service if trained taxonomists from other countries would take more

* Arrangement according to natural relationships—based mainly on flower structure.—Ed.

† A type specimen is the individual plant on which the original scientific description of the species was based.—Ed.

‡ A flora is a systematic treatise on the plants of a given area.—Ed.

frequent advantage of the provision for research that Kew offers.

Utilitarian Plants

Various museums in the Gardens house the extensive collections of plant products, which provide most valuable reference and research material for problems of economic botany. Here are to be seen gums, resins, drugs, fibers, timbers, fruits, and seeds, in their crude state and in various stages of preparation for economic purposes. An extensive collection of pollens enables one to identify the source of a honey from the pollen grains it contains; while comparison of specimens with drug plants, spices, etc., enables substitutions, whether intentional or accidental, to be recognized.

Nursery for trees and shrubs at Kew



Kew has given notable service in the introduction of economic plants to areas in which they had not been previously cultivated; and Kew played a notable part in the establishment of plantation Rubber, Cinchona,[§] and Cocoa, as well as many others. This was due largely to the development of a kind of traveling greenhouse, known as a Wardian case, in which live plants could be protected and cared for in transit on a ship's deck.

Instruction

Although Kew is a research institution and not a teaching establishment in the real sense of that term, its facilities are used to train student gardeners, who gain experience in the culture of a great diversity of plants. And it is a fact that the possession of a Kew Certificate has been the steppingstone to many of the more important posts in practical horticulture both in England and in other countries. Students are accepted only from among those who have already had four years' practical experience in a first-class establishment and thus can profit by the advanced training at Kew.

The Gardens themselves are an epitome of the history of gardening in England. The more typically English gardening, with its characteristic emphasis on the natural beauty and habit of the plants cultivated, owes much to Sir William Chambers, closely associated with Kew, whose famous essay so greatly influenced the development of English landscape gardening. The fine avenues and formal treatments echo the period of Le Notre; while even the massed bedding display reminiscent of Victorian horticulture is also exemplified. Kew thus contributes both pleasure and intellectual profit; and the recreation is none the less because it is a by-product of the more serious purpose.

[§] Peruvian Bark Tree, source of quinine.
—En.

NOTES ON CONE-BEARING TREES

How to know a few important groups, and how to choose which ones to plant

Albert L. Baily, Jr.

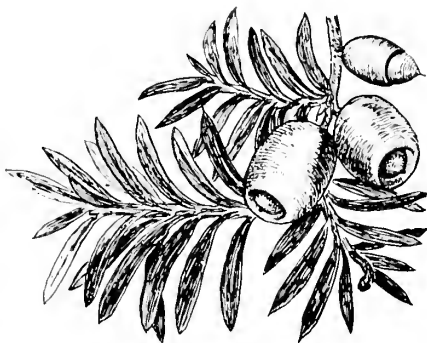
I HOPE that the reader has been disturbed at times by a tea-room sign "Twin Pines" when the trees that dominate the front yard are plainly Norway Spruce. Perhaps he has heard the remark: "I just call them all 'Pines' because they all look exactly alike to me." But many people would like to know evergreens. They would like to feel well acquainted with the trees on their own lawns, at least. It is very gratifying to be able to say to one's friends: "Now, this one is a Limber Pine. It comes from the Rocky Mountains, and is one of the very few White Pines without fine teeth on the needles. It produces a seed without any wing, while most White Pines have winged seeds."

Distinguishing Features

For many people the distinction between Firs and Spruces is puzzling. There are five principal groups of cone-bearing trees which are frequently confused. They all bear needles scattered singly along the twigs: the Yews, Firs, Hemlocks, Spruces, and the lone Douglas-fir.

CONES

If cones of these various trees were always to be found, the task of identification would be much simpler; but the individual tree in question may not happen to have cones at the time. If there are cones (and one should, of course, look under the tree as well as on it), the distinction may be made fairly simply.

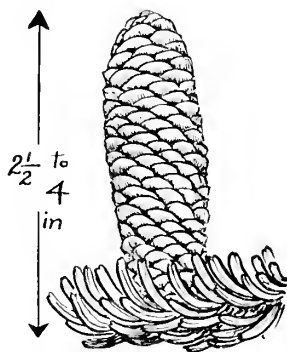


Yew branch with "berries"

1. **Yews** do not bear cones at all, but "berries," usually red when ripe—and quite palatable, too.*

2. **Fir** cones always stand upright on the uppermost branches of the tree, somewhat like birds gone to roost. The cone scales fall singly, shelling from the central core, leaving a tell-tale spike where they grew; such spikes identify a Fir.

Tip of Fir branch with cone



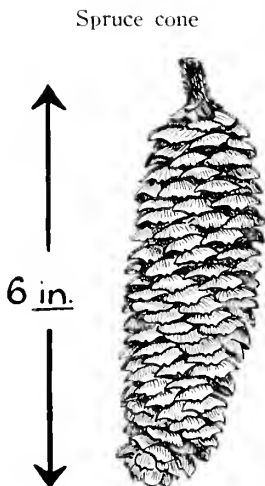
*The seeds must not be chewed or swallowed, however, for they are poisonous.—Ed.

3. **Hemlock** cones hang downward at the ends of branches all over the tree; they are rarely over an inch in length.

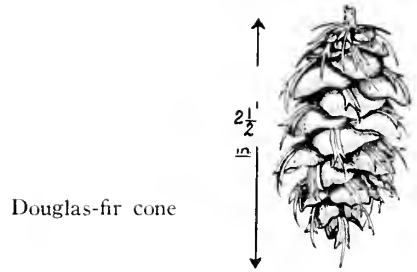


Left: Hemlock cone. Right, a cone scale (inside view) enlarged to show winged seeds (typical of most cone-bearing trees)

4. The cones of the **Spruces** and the **Douglas-fir** also hang downward, but they are never as small as Hemlock cones. Both kinds drop to the ground whole, when old. The Douglas-fir cone is furnished with large bracts which project from between the cone scales. These bracts give the cone a most peculiar appearance; each one has a long curving midrib ending in a long point, and has two side flaps. Spruce cones also have bracts, but these are so small that one has to tear the cone apart to see them.



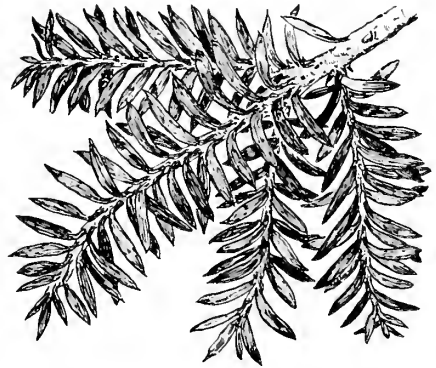
Spruce cone



Douglas-fir cone

TWIGS

If there are no cones to study, there are other ways of distinguishing these five groups of trees: one may look at the twigs.



1. **Yew** twigs are green or greenish, because the leaves seem to grow down along the sides of the twigs and cover them up. Between the leaf bases are grooves. Yew is the only one of the five groups that has green twigs.



2. **Fir** twigs (with rare exceptions) have no grooves. When the leaves are pulled off, small circular scars are left on the twigs.

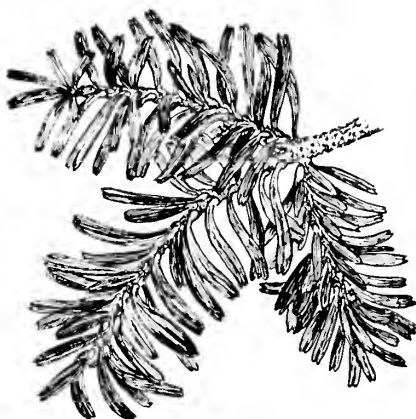


Fir twigs: left, back; right, front →

3. **Hemlock** twigs are deeply grooved and very rough, showing prominent stumps when the leaves are pulled off.



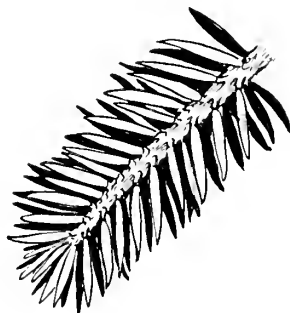
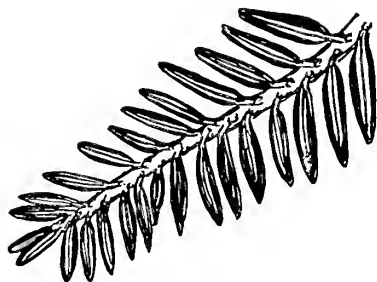
Hemlock twigs: above, front; below, back



4. **Spruce** twigs also are rough and grooved; but the stumps under the leaves are not the same as in the Hemlock.



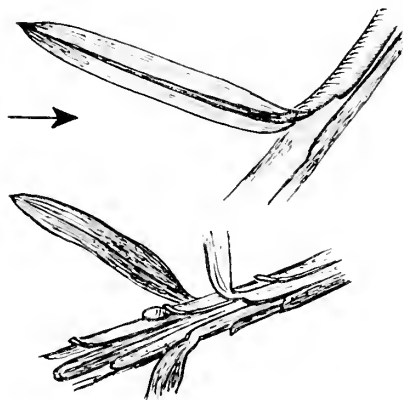
Spruce twigs: above, front; below, back



5. The **Douglas-fir** has twigs nearly like the Firs: almost smooth, with circular scars very slightly raised.

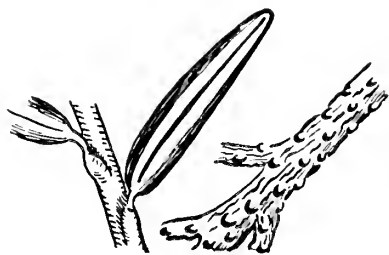
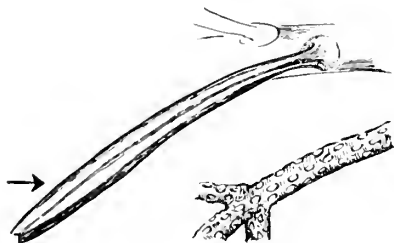
LEAVES

The leaves are distinctive, also, as one might expect. Most cone-bearing trees have leaves with microscopic teeth along their edges. If one draws the leaf between the lips, holding it by the tip, the teeth will be distinctly felt if they are there. Also, if a leaf is cut through the middle, it will show a characteristic cross section.



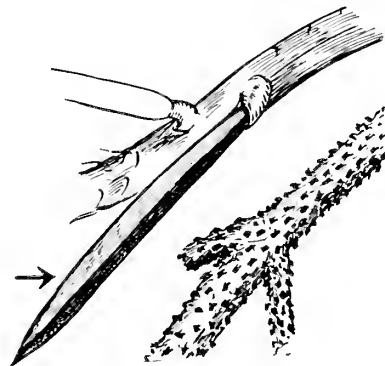
1. **Yew** leaves have no teeth. Their cross section shows them to be flat with a central ridge on the upper side.

2. **Fir** leaves have teeth, are usually grooved above, and are usually (though not always) quite flat.



3. **Hemlock** leaves are sometimes without teeth (our common Hemlock, for instance); they are flat, and usually grooved. Each leaf has a small stalk (or petiole) about $\frac{1}{16}$ inch long.

Spruce: left, stem showing attachment of needles; right, rough bare twig



4. **Spruce** leaves have teeth, and are almost always four-angled in cross section.

5. The **Douglas-fir** has leaves in every way like Firs.

OTHER DISTINCTIONS

In addition to these characteristics, a few might be mentioned which are peculiar to each group.

1. The **Yew** is the only one having spherical buds along the twigs.

2. The **Hemlock** is the only one with a leader that bends to one side. All the others stand stiffly upright.

3. The **Douglas-fir** is the only one with a long sharp bud (with the exception of one very rare Fir in California).

One further distinction between the Firs and Spruces is interesting, though not very helpful in a practical way.

When Fir needles are flat, there are two white lines on the *under* side. When Spruce needles are flat, they also have two white lines; but these are on the *upper* side of the leaf; the leaf is twisted, and so this is not easily seen.

Outstanding Kinds to Plant

When anyone who owns real estate becomes familiar with the distinguishing characteristics of the commoner evergreens, he is likely to seek advice as to what kinds to plant. Such advice is not easy to give, because the conditions for planting vary greatly. Soils, temperature, city soot, the exposure to wind, the space available, all affect the choice. The cone bearers in the following list have been chosen for their outstanding beauty or interest. They are not all easily available, but most of them can be located by an earnest searcher.

THE FIVE GROUPS DESCRIBED ABOVE

Japanese Yew (*Taxus cuspidata*). A rapid grower, hardy, very handsome, particularly the upright form.

White Fir or "**Concolor Fir**" (*Abies concolor*). Well-known species available everywhere, hardy, drought resistant, foolproof; should reach 70 feet.

Korean Fir (*Abies koreana*). Tree to 30 feet. Short, stubby needles pointing in all directions. Brilliant white lines and white buds. Hard to locate.

Needle Fir (*Abies holophylla*). Handsome tree, with long sharp-pointed needles; should reach 60 feet.

Nikko Fir (*Abies homolepis*). One of two Firs with sharply grooved twigs. Vigorous grower, making a fine tree; reaches 100 feet in Japan.

Greek Fir (*Abies cephalonica*). Tall narrow Fir, with densely crowded leaves; often bears cones when fairly young.

Japanese Hemlock (*Tsuga diversifolia*). There are two Japanese Hemlocks, both good, but quite different in growth. This one is a smaller, denser tree, quite distinctive; picturesque and irregular. The leaves are crowded and brilliantly white on the back.

Carolina Hemlock (*Tsuga caroliniana*). Much praised by those who know: the late Dr. Sargent considered it one of America's finest trees. Bushier, more graceful than the commoner Hemlock; 40 to 50 feet.

Himalayan Spruce (*Picea Smithiana*). Tall tree; drooping branchlets; very regular growth. Much to be preferred to the Norway Spruce. Hard to find, but worth the effort.

White Fir (*Abies concolor*)

McFarland photo





McFarland photo

Servian Spruce (*Picea Omorika*)

Tigertail Spruce (*Picea polita*). Very stiff, sharp needles. Buds dark brown to purple. Growth slow, and habit dense. Those who see it remember it.

Oriental Spruce (*Picea orientalis*). Old favorite. Some magnificent specimens grow on various estates in the East. Small needles, dense growth.

Servian Spruce (*Picea Omorika*). The finest Spruce I am acquainted with; very dense and regular. Flat needles, white on the back; the branches turn upward and give a two-tone effect. Large nurseries should have it.

Douglas-fir (*Pseudotsuga taxifolia*). Widely planted for reforestation, as well as for ornament. Needs plenty of room. The type with thin green needles is much to be preferred. The ones with shorter, bluer needles are likely to be attacked by aphids; then the needles kink and the tree becomes unsightly.

PINES AND CLOSE RELATIVES

A few unusual Pines are suggested, though the list might well be expanded by adding such well-known trees as the **Eastern White Pine** (*Pinus Strobus*) and the **Austrian Pine** (*Pinus nigra*).

Korean Pine (*Pinus Koraensis*). This Pine has vigorous dense growth, and becomes a tall tree. It can be told from other White Pines by two characteristics: its twigs are thickly yellow-hairy, and its needles are flat or concave on the back. Most Pines have needles with rounded backs. Needles 4 inches, yellow-green.

Swiss Stone Pine (*Pinus Cembra*). Narrow, dense tree of rather slow growth. Its twigs are densely hairy and dark brown. Expensive to buy, but a great satisfaction to possess.

Limber Pine (*Pinus flexilis*). One of the few White Pines without fine teeth on the needles, and without a wing on the seed.

Mexican Stone Pine, or Nut Pine (*Pinus cembroides*). This can be purchased from a few nurserymen, and is a very interesting tree. Its home is in the Southwest, where it produces crops of piñon nuts. The variety *monophylla* is a puzzling curiosity; it has cylindrical leaves that grow singly. For some years there was a large one in the Morris Arboretum. It is never very large, however, 15 feet being a remarkable height for it in captivity.

Lacebark Pine (*Pinus Bungeana*). The bark peels off, leaving white patches. The needles are sparsely placed. While it is classed as a Soft Pine, it has three needles in a group. It should reach 40 feet.

Western Yellow Pine (*Pinus ponderosa*). Very large tree in its own range. Long, heavy, bluish-green needles—sometimes kinked in the middle, giving the tree a shaggy appearance.

Western Yellow Pine (*Pinus ponderosa*) in a National Forest in Colorado →

U. S. Forest Service photo



Table Mountain Pine (*Pinus pungens*). Native to the Allegheny Mountains. Has irregular scrubby growth, and large spiny cones that hang on the branches for years. Our specimen attracts a considerable amount of attention. The tree is practically never carried by nurserymen in America, although English nurserymen sometimes have it.

Golden-larch (*Pseudolarix amabilis*). In our arboretum this tree attracts a great deal of attention. No true Larch can match its delicately arranged leaves. While not evergreen, it is a cone bearer, having at times large cones which shell apart when mature, like those of a Fir. It is difficult to find, since most nurserymen have never heard of it.

The true **Cedars** (*Cedrus*). There are three available. If you live not north of Baltimore, plant the Deodar Cedar (*Cedrus Deodara*). Farther north, plant either the Cedar of Lebanon (*Cedrus Libani*), or the Atlas Cedar (*Cedrus atlantica*). They all make large trees, particularly beautiful both when young and when old.

BALD CYPRESS AND RELATIVES

Pond Cypress (*Taxodium ascendens*). Quite different in form from the Bald Cypress (*Taxodium distichum*), which also is well worth planting, particularly in moist ground. The Pond Cypress is harder to locate, but worth the trouble. It is tall and narrow, with deeply ridged bark, and usually appears in the older tree collections near Philadelphia.

Umbrella-pine (*Sciadopitys verticillata*). This is a most interesting tree. It is not a Pine at all. It has leaves about 3 inches long, in circles around the twigs. It is a high-priced tree, as a rule. It grows slowly, but can attain a good size.

SCALE-LEAVED KINDS

Among the scale-leaved cone bearers, many are worth planting. The following are mentioned as the best in my opinion.

Giant Arbor-vitae (*Thuja plicata*). Slow of growth, but keeps on growing; said to reach 150 to 180 feet.

Incense-cedar (*Libocedrus decurrens*). Tall, narrow, and impressive; it should reach 60 or 70 feet. Thick, red, shreddy bark; leaves dark green. Apparently quite hardy at Philadelphia. We think it much the best of all the so-called accent trees.

Lawson Cypress (*Chamaecyparis Lawsoniana*). This is a noble tree in the Northwest. It has many peculiar horticultural varieties, but the natural type is much to be preferred where there is room for it to grow.

Hinoki Cypress (*Chamaecyparis obtusa*). Like the Lawson Cypress, this tree runs to horticultural varieties; while many of these are well suited for particular places, the beauty of the tree is best seen in the natural type. Good-sized tree.

I hesitate to close this list without mentioning a few personal experiences. Lately I have met the **Alligator Juniper** (*Juniperus pachyphloea*) in the high mountains of Arizona; such a tree might well prove hardy in the East. We have at Westtown an Incense-cedar which was pulled up on the top of Palomar Mountain in San Diego County, California, over twenty years ago. Specimens of the Bigcone-spruce (*Pseudotsuga macrocarpa*), gathered at the same time and place, were quite unable to withstand the eastern winters. We are still nursing along two little Bristlecone Firs (*Abies venusta*) which are putting up a pretty good fight for survival. These came from seed collected on the coast ranges south of Monterey, California. These experiences illustrate the pleasure one can get from collecting his own cone-bearing trees.

Lawson Cypress (*Chamaecyparis Lawsoniana*) →

McFarland photo





FRUIT OR VEGETABLE

Which are you eating?

Conrad B. Link

A FREQUENT question sent to the Botanic Garden is whether a tomato is a fruit or a vegetable. The answer is that it is either, depending on the way in which we define these two terms—whether as a housewife buying from the grocer, or as a botanist.

From a culinary point of view, a fruit is generally used as a dessert, while a vegetable is usually associated with the main portion of the meal.

Botanically, a true fruit develops from a flower. It usually consists of the seed case with its seeds; but the seed case is generally the part for which it is eaten, and it does not necessarily have seeds: seedless grapes, seedless oranges, and bananas are true fruits. Most of the fruits that are used for eating are fleshy. Many nonedible fruits are dry and hard, such as seed pods of garden plants like Larkspur or Peony. The edible fruits are usually sweet—but not lemons and limes. They do not need to be ripe when eaten: green olives, for example, peppers, and cucumbers.

A nut is, strictly, a type of fruit with a very hard shell; but in a popular sense the term may include the thinner-shelled

peanut. Nuts are rich in oil, and of high food value; and the edible portion is the seed or an associated part of it.

Botanically speaking, a vegetable is any plant part used for food, other than the fruit and its associated parts. It includes stems, whether they grow under or above ground, such as the potato and asparagus; roots, such as sweet potato, carrot, and turnip; buds, such as cabbage, Brussels sprouts, and artichoke; leaves, such as spinach, leaf lettuce, and endive; leaf stalks (petioles), such as celery and rhubarb; or stem and flower buds, such as broccoli and cauliflower. An onion is a bulb—a kind of bud.

In the grocery store, seeds (other than those from nuts) are included with vegetables; and so indeed are certain fruits. Peas, beans, and lentils are seeds; green or wax beans, which include both seeds and pods, are true fruits. The tomato, squash, cucumber, and pepper are actually fruits, yet are served as vegetables. But what about the squash, rhubarb, or carrot when made into a pie? The squash is a true fruit, but sold as a vegetable; the carrot and rhubarb are true vegetables—yet, when served in pies, are desserts. But could this make them “fruits”?—Enjoy your fruits and vegetables, whether you use the botanical or the culinary terms.

GARDEN DESIGN FOR A SMALL SUBURBAN RESIDENCE

Transformation within a year

John S. Kistler

THIS property (about 65 × 90 feet) slopes to the south, and is bounded on three sides by streets, one of which is a heavy traffic artery. When the house was built, there was no vegetation near it except two old Silver Maples whose condition was so bad that they had to be removed.

The owner wished to use his grounds as an outdoor living area, where he and his family could entertain their friends. This was impossible because of the slope of the ground and the lack of privacy. The owner desired also a planting that would give color but would require a minimum of upkeep.

Two terraces were built, to give usable level ground. Both were adjacent to the house, one on the south and one on the west. The terrace on the south required a 4-foot retaining wall. It is paved with smooth flagstone, is bordered with flower beds, and has a water feature which can be seen from the living room, sun porch, and den. The west terrace is of grass, and overlooks the south terrace. It is terminated by a bay, formed principally of tall evergreens in line with the large picture window of the living room. The two terraces combined have more square footage than the entire first floor of the house. The plantings between the terraces and the streets are arranged so as to give privacy from passing cars, but to afford a view and to allow the air to circulate.

The front approach to the house is leveled off. There is a lawn, with a planting of trees to frame the house, and a Box hedge along the front porch.

All service is kept to the areas between the house and the neighboring properties. The area outside the dining room is an Azalea garden, made by massing the plants that were originally spotted around the front of the house. The Azaleas are backed by a planting of tall evergreens, which also screen out a neighbor's garage. The area outside the kitchen is for drying and storage, and is enclosed by a *Spiraea* hedge.

The owner had an allotment for expenses each year. All construction was completed the first year, and as much planting as the budget would allow—all planting adjacent to the house and in the "screen areas" between the streets and the terraces; also evergreen and flowering trees that gave maximum coverage. The shrubs are to be added the second year.

The entire planting is planned for low maintenance expense. It requires weekly mowing of the lawn, and monthly cultivating of the shrub beds. The flower garden is restricted to the beds on the south terrace, and is kept up by the family.

Grounds at south side of house, before planting

Author photos

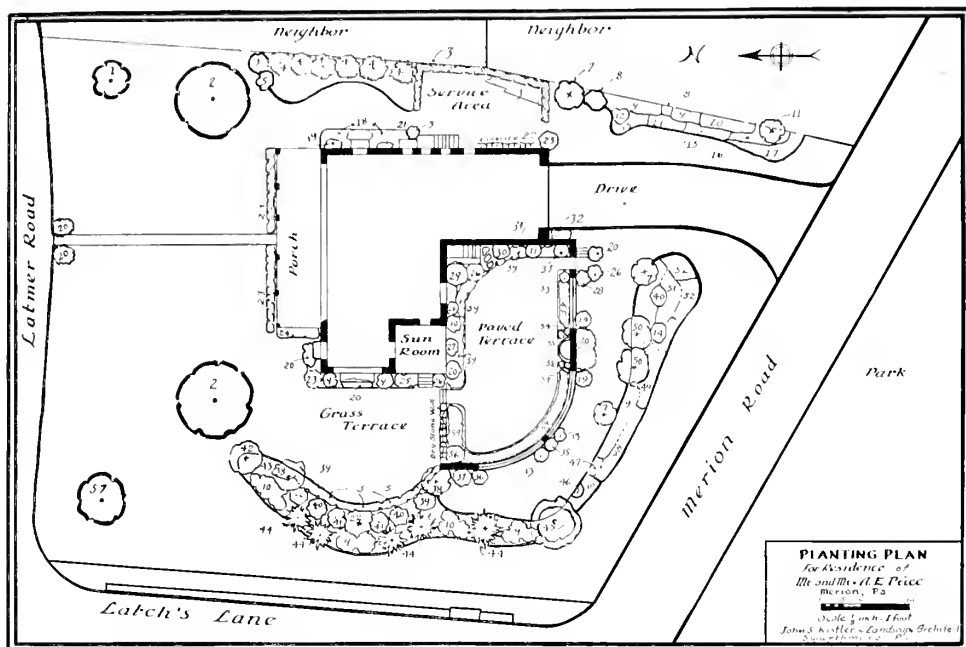




Grounds at south side of house, showing terrace and preliminary planting

Names of Plants Indicated by the Numbers on the Plan

1. Weeping Rosebud Cherry—
Prunus subhirtella var. *pendula*
2. Purple Beech—
Fagus sylvatica var. *atropunicea*
(var. *atropurpurea*)
3. Van Houtte Spirea—
Spiraea Vanhouttei
4. Arbor-vitae—
Thuja occidentalis fastigiata
5. Snow Azalea—
Rhododendron mucronatum (*Rhododendron ledifolium album*)
6. Amoena Azalea—
Rhododendron obtusum var. *amoenum*
7. Flowering Dogwood—
Cornus florida
8. Black-haw—*Viburnum prunifolium*
9. Rose Bay—*Rhododendron maximum*
10. Mountain-laurel—*Kalmia latifolia*
11. Atlas Cedar—
Cedrus atlantica var. *glauca*
12. Japanese Snowball—
Viburnum tomentosum var. *sterile*
13. Inkberry—*Ilex glabra*
14. Pinxter-flower—
Rhododendron nudiflorum
15. Snowberry—*Symphoricarpos mollis*
16. Jasmine—*Jasminum nudiflorum*
17. Prostrate Juniper—
Juniperus communis depressa plumosa
18. Hinodegiri Azalea—
Rhododendron obtusum var. *Hinodegiri*
19. Lilac—*Syringa* in variety
20. Japanese Yew—*Taxus cuspidata*
21. Chinese Quince (espalier)—
Chaenomeles sinensis
22. Flowering Crab Apple (espalier)—
Malus hupehensis
23. Dwarf Box—
Buxus sempervirens suffruticosa
24. Japanese Holly—*Ilex crenata*
25. Glossy Abelia—*Abelia grandiflora*
26. Yodogawa Azalea—
Rhododendron yedoense
27. Viburnum—*Viburnum Carlesii*
28. Firethorn—
Pyracantha coccinea var. *Lalandii*
29. Franklin-tree—*Franklinia alatamaha*
30. Redvein Enkianthus—
Enkianthus campanulatus
31. Trifoliolate-orange (Hardy-orange)—
Poncirus trifoliata
32. Japanese Quince—
Chaenomeles lagenaria
33. Storax (Japanese Snowbell)—
Styrax japonica
34. Japanese Wisteria—
Wisteria floribunda var. *macrobotrys*
35. Mock-orange—
Philadelphus coronarius
36. Chaste-tree—*Vitex Agnus-castus*
37. Forsythia—
Forsythia intermedia var. *spectabilis*
38. American Holly—*Ilex opaca*
39. Carolina Rhododendron—
Rhododendron carolinianum
40. Viburnum—*Viburnum setigerum*
41. Flame Azalea—
Rhododendron calendulaceum
42. Tree Box—
Buxus sempervirens arborescens
43. Periwinkle—
Vinca minor var. *Boxlesii*
44. Hemlock—*Tsuga canadensis*
45. Red Buckeye—*Aesculus Pavia*
46. Cornelian-cherry—*Cornus mas*
47. Shadbush or Service-berry—
Amelanchier canadensis
48. Thunberg Spirea—
Spiraea Thunbergii
49. Drooping Leucothoe—
Leucothoe Catesbaei



50. Kousa (Chinese Dogwood)—
Cornus Kousa
51. Pfitzer's Juniper—
Juniperus chinensis var. *Pfitzeriana*
52. Cranberry Cotoneaster—
Cotoneaster apiculata
53. Japanese Pieris—*Pieris japonica*

54. Evergreen Cotoneaster—
Cotoneaster Henryana
55. Pinxter-flower—
Rhododendron nudiflorum
56. Silver-bell—*Halesia carolina*
57. Starry Magnolia—*Magnolia stellata*
58. Pool
59. "Flowers"

FALL-BLOOMING IRISES

Fall-blooming Irises succeed best in the milder sections of the country; but with a little extra care, such as watering during the dry summer months, they often give a display in the North in September and October if a frost does not spoil the development of the buds. Several breeders are working on this project, and we expect much progress.

The most reliable kinds have been Autumn Queen (white), Eleanor Roosevelt (fluorite purple), and Southland (rich yellow). We have had varying success with Autumn Haze (a soft lavender), October Blaze (large red-purple),

and Martie Everest (tall blue), in the Northwest. We are reasonably certain these would give a good account of themselves in more temperate climates.

It is interesting that some of the June-flowering types have an occasional fall blossom. A few varieties that have a tendency to do this are Radiant (terra cotta), California Gold (brassy yellow), and Mme. L. Aureau (a heliotrope, marked white).

ROBERT SCHREINER

Other articles on Irises appeared in PLANTS & GARDENS, Spring and Summer, 1948.

HARDY PERENNIAL ASTERS

For bloom throughout the season

LeRoy Breithaupt

AMONG herbaceous perennials, few are so easy to grow as hardy Asters, and few so versatile in color, height, and season of bloom.

Hardy Asters range in height from 6 inches or less up to 6 feet or more, and in color from white to red, pink, purple, and lavender. Varieties differ also in size of flowers and abundance of bloom. They are referred to as Michaelmas Daisies, because most of the cultivated varieties blossom in September, near the feast of St. Michael. However, there are varieties that bloom in the spring and in the summer.

Flowers and buds of *Aster Frikartii*
Wonder of Stafa

McFarland photo



Aster tibeticus is one of the best for springtime bloom. This makes a low mat from which pretty lilac-tinted lavender-blue flowers are borne early in May on 12-inch stems. Similar, slightly taller varieties are Star of Eisenach and Star of Wartburg. These bloom from late May into June. The flowers are large and lavender-blue. *Aster alpinus* Goliath is a dwarf, with bluish purple flowers in May and June. [See color picture in center.]

From July until frost ends the flowering season, Wonder of Stafa (often listed as *Aster Frikartii*, or Frikartii Wonder of Stafa) provides a colorful display in the garden. It makes a bushy plant about 2 feet high, producing extra-large, attractive lavender-blue flowers in great abundance.

Species

Although there are hundreds of species of hardy Asters, our garden varieties have been originated mostly from three. These, in the order of the number of garden varieties produced, are the New York Aster (*Aster novi-belgii*), the New England Aster (*Aster novae-angliae*), and the Italian Aster, or Italian Starwort (*Aster Amellus*). The garden varieties of Michaelmas Daisies were produced by both European and American plant breeders.

Varieties

Beechwood Challenger is probably the best red hardy Aster to date. It is earlier and shorter than most of the *Aster novi-belgii* varieties. Mt. Everest is a fine white, with long willowy stems about 5 feet tall, bearing large clear white flowers with golden centers late in September. Violetta (violet-blue) is a good companion for Mt. Everest, blooming only a few days later. There are scores of



M. Farland photo

Italian Starwort (*Aster Amellus*)



McFarland photo

New England Aster (*Aster novae-angliae*)

Aster novi-belgii varieties, including Skylands Queen (lavender), Climax (lavender), Charles Wilson (red), Palmyra (pink), Sunset (pink), Gayborder Blue, Amethyst, and Mulberry.

The variety Barr's Pink is a leader among the *Aster novae-angliae* varieties. It is earlier than most of this type and not so tall; it has strong self-supporting stems that are leafy and ornamental before, as well as during the blooming period. Extra-large rosy pink flowers open about mid-August, and appear in great numbers far into September. Harrington Pink (lovely shell-pink) [see color picture in center]. Survivor (rosy pink), Rosea Superba (rosy pink), Mt. Rainier (white), Mrs. F. W. Fitzpatrick

(violet-blue), and Ryecroft Purple are all very hardy, and good where tall later varieties are wanted.

There are several varieties of *Aster Amellus* that bloom in late summer. Among these are King George (violet-blue) and Sonia (pink). Large flowers are borne on plants about 2 feet high. Somewhat similar are the varieties Summertime and (*Aster Frikartii*) Jungfrau. These are not so hardy as the *Aster novae-angliae* and the *Aster novi-belgii* varieties.

Niobe is a fine white dwarf hardy Aster (variety of *Aster dumosus*). It is about 6 inches high, and bears an abundance of flowers in September. It combines well with Little Belle, which bears lilac-tinted flowers on shapely plants about 9 inches high, and Rosa, which is covered late in September with rosy pink flowers on plants 12 to 15 inches high. Many other dwarf Asters are available, including Snowsprite, Constance (shell-pink), Countess of Dudley (rosy pink), Nancy (orchid-pink), and Victor (lavender).

Pacific Amaranth is a new summer-flowering variety, about 2 feet high, that produces great numbers of reddish purple (amaranth) flowers from July to September. Purple Feather is another new summertime Aster. The purple-blue flowers are borne in August and September on strong attractive plants about 30 inches high. Oregon Snowbank, also new, has large, clear white flowers with golden centers in August and September, on sturdy shrub-like plants about 3 feet high.

Chastity (a variety of *Aster ericoides*) blooms in September, having tiny, delicate white flowers with golden centers on slender open-branched stems 20 to 30 inches high. It adds interest to the perennial border and is good in flower arrangements. Burbank's Charming (light pink) and White Plume are tall varieties that produce small flowers on willowy stems in October.



Author photo

Asters Wonder of Stafa, Pacific Amaranth, and Oregon Snowbank in the author's garden

Hybrid

Among the summertime Aster-like plants may be mentioned the yellow-flowered *Solidaster luteus*. This blooms in August, bearing small, delicate, creamy yellow flowers in great numbers, high on plants 2 to 3 feet tall. It is reputedly a cross between some kind of Goldenrod (some species of *Solidago*) and the White Upland Aster (*Aster ptarmicoides*).

Culture

For best results, divide and replant hardy Asters every three years or oftener. This should be done in March or April before there is too much new growth. Select

vigorous new divisions from the outside and discard the centers. If only a few stems are kept, they will branch out and make a much better plant than if many leggy stems are allowed to grow. Some kinds are improved in form by pinching back in June, a trick to be learned by experience.

All hardy Asters need sunshine, reasonably fertile soil, and a considerable amount of moisture. They are bothered very little by pests and diseases if they are divided often and grown in a congenial location, though a few pests can cause trouble. Their masses of fine, starry bloom lighten the effect of heavier flowers.

DAHLIAS

Kinds, care, and culture

Edward B. Lloyd

WITH the approach of autumn, Dahlias are maturing and producing their finest flowers. This is the time to learn the newer varieties. The American Dahlia Society classifies Dahlias in three groups for size: the large exhibition blossoms (over 8 inches in diameter), the flowers between 4 and 8 inches, and the popular Pompons and Miniatures (under 4 inches), which are so useful in home decoration and arrangements. Within the size groups, Dahlias are further classified as Cactus (Semi-cactus, Incurved, and Straight Cactus), Decorative (Formal and Informal Decorative), Miniatures (both Cactus and Decorative types), and Pompons.

Cactus Dahlia Yellow Glory

McFarland photo



Varieties

A few Dahlias which are not "temperamental" but are easy to grow, and produce plenty of flowers for cutting, include, among the Cactus varieties, Yellow Glory, Ballego's Surprise (white), Pink Flamingo, and Mme. Jussiant (lavender). Among the Decoratives one should find Jersey Beauty (pink), Mrs. I. de Ver Warner (lavender), Miss Oakland (white), Mrs. George LeBoutillier (red), Straight's White, Jane Cowl (buff, almost orange at times), and Murphy's Masterpiece (a large red).

For those who wish to grow Dahlias especially for home decoration and for arrangements, many varieties of Miniatures can be recommended. These require no disbudding or special attention, and provide a multitude of blossoms from early August until frost. Arabesque (a yellow Cactus), Red Robin (a Formal), Baby Fonteneau (a pink Cactus), Bishop of Llandaff (a red Peony-type Miniature with bronze-colored foliage), Geneva Crystal White (a Cactus), Little Susan (a pink Formal), and Passepartout (a red Formal), are very satisfactory Miniatures. For Pompons one should try Miss Marjorie (plum color), Little Edith (yellow, slightly tipped red), Ila (maroon), Atom (red), Clover (as its name implies), Pink Duchess, and Mrs. J. Telfer (white). This list is, of course, far from complete. A visit to a Dahlia show will provide opportunity to make one's own selections for another year.

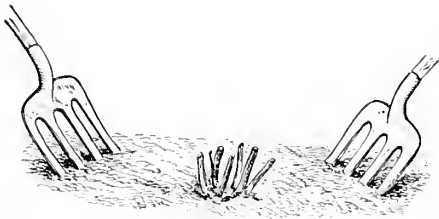
Cut Flowers

The life of Dahlia blossoms after they are cut may be very much prolonged by a few simple precautions taken at the time of cutting. First of all, cut only fully matured blossoms. Flowers with a withered petal or two will keep longer, under similar conditions, than young ones.

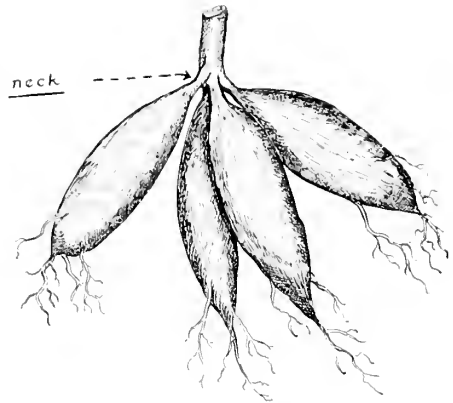
Cut the flowers early in the morning before they begin to wilt, or in the evening after they have revived from the effects of the sun and winds of the day. Make the cut with a sharp knife, so that the microscopic tubes in the stem (which supply water to the flower head) are not crushed. Dahlias should be cut at least eight hours before they are to be used. As soon as possible after being cut, the stems should be placed in deep cool water in a cool, draftless, and dark part of the basement. There is a considerable advantage in trimming off an inch or two of the stem *under water*. This removes that portion of the stem in which air may have entered the microscopic tubes and interrupted the water passing to the flower head. When the supply of water fails, of course the blossoms wilt. Use only clean water and clean containers. Once every day change the water and trim off the end of the stem as mentioned above. When these suggestions are followed, the Dahlia is a long-lasting flower.

Storage of Roots

When frost has killed the Dahlia plants, cut the top growth off about 3 inches above the ground. The roots should be left in the ground for a week or ten days, if possible, before being dug. A long-tined spading fork is best for digging Dahlia roots. Two forks are even better, if someone is available to help. The



forks are pushed into the soil 12 to 20 inches from the plants, as most Dahlias have wide-spreading root systems. As the soil is being loosened around the circumference of the root system, a light gradual pull on the old stump will help



the entire clump of roots to come to the surface intact and without "broken necks." The Dahlia root has no eyes, and cannot produce new plants the following season unless the neck of the root is attached to the old stalk: it is at this point that the new eyes for next season's plants will develop. The label from the stake should be wired to each clump for future identification. The roots should not be exposed to the sun for more than a few hours.

Decorative Dahlia Jersey Beauty

McFarland photo



The ideal storage place is a cellar with an earth floor (for humidity), where a temperature of 40° to 45° F. can be maintained. Most home gardeners, however, are obliged to store their Dahlias in the cellars of their homes, where it is usually too warm and dry. In such conditions, the root clumps should be placed in the coolest part of the cellar, packed in boxes or baskets with dry sand, peat moss, or granulated cork. About mid-December, it is well to unpack the clumps and examine them. Trim out any part showing rot or decay, and discard roots with broken necks. Dip all fresh cuts in powdered sulfur. If the roots show signs of shriveling, they may be moistened slightly with a fine spray. Well-ripened and unfrosted Dahlia roots stored as described above should keep well until spring with no further attention.

Miniature Dahlia Bishop of Llandaff

McFarland photo



Culture

The Dahlia responds wonderfully to good care. A prime requisite for sturdy growth is frequent cultivation. This not only prevents weed growth, but helps to prevent soil moisture from escaping into the air, and stimulates root growth. Cultivate at least once a week, and as soon after rain or irrigation as the ground can be worked. The soil should be well prepared in the spring, but an additional feeding in August will prove beneficial. A 5-10-10 fertilizer gives the proper proportion of the most important plant food materials. About a handful of this should be used to each plant. It should be scattered, between 10 and 18 inches from the stalk of the plant, and raked in lightly. If rain does not come soon, it will be necessary to irrigate in order to make this material available to the plant.

Disbudding

When the plants are about a foot high, they are pinched back; this treatment causes side branches to develop from each pair of leaves. The buds on these side branches usually come in clusters of three, and the middle bud of each cluster is generally the strongest. If you wish to have large flowers, remove the two outer buds; then the strength that the plant would expend in producing flowers from all three goes into the terminal bud which is left. The next two or three sets of branches (at each pair of leaves below the original terminal bud) may be removed also, further increasing the size of the blossom to be produced.

Pests

To grow good Dahlias, insects must be controlled. The easiest way is to prevent them from becoming established. Good soil and adequate fertilizer, water, and culture are all of no avail if the bugs get the upper hand and do irreparable damage before the gardener is aware of their presence.

Aphids cause a lessening of vitality by sucking plant juices on the stems and around the buds. They can be controlled by dusting or spraying with contact insecticides such as pyrethrum extract, nicotine sulfate, or rotenone.

Corn borers drill holes in the stalk, usually at a leaf or branch; they live and grow inside the stalk until the plant is so weakened that it breaks. The adult moth of the corn borer lays its eggs on a leaf, and it is at this time only that control measures are effective. Spraying with a 1 per cent suspension of DDT proves most effective.

Japanese beetles are very destructive of blossoms, but can be effectively controlled by the 1 per cent DDT. Leaf hoppers, tarnish plant beetles, and thrips are also easily controlled by DDT.

Red spiders are minute black-and-white to brownish creatures, nearly always found on the under side of the leaves. These spiders multiply rapidly in hot dry weather and cannot stand cold water, especially when applied under pressure. They are immune to DDT, and so other control means must be used. Spraying with hexethyltetraphosphate, sold under the trade name of Hexide, in dilution of 1 to 1600 (one half teaspoon to one gallon of water) is very effective. This is a contact spray, however, and will have no effect upon the eggs. Several sprayings at intervals of a week should clean out any infestation of red spiders.

DDT may be mixed with most other insecticides, including the Hexide previously mentioned (but not with insecticides containing lime), thus making a one-application spray. Former insecticides killed by contact, or as stomach



McFarland photo

Pompon Dahlia

poisons, or by paralysis only. One reason for the effectiveness of a combination of DDT with nicotine sulfate, pyrethrum extract, rotenone, or Hexide, is that it gives all methods of killing at one treatment. DDT is toxic for a longer period than most other insecticides, and although not so rapid as some, it is definitely more certain.

None of the requirements for good Dahlias is difficult to fulfill. The harvest of wonderful color and bloom that results from good care will gladden the gardener's heart when the garden season is coming to a close.

DOGWOODS FROM SEED

If you would like to supplement the Dogwoods obtained from your nurseryman, you can easily raise them from seeds. More about this in the winter issue. Meanwhile, collect the red Dog-

wood berries before the birds get them. You may separate the seeds from the pulp while fresh, or allow the berries to dry. The pulp can easily be removed later if the berries are soaked in water.

HARDY CHRYSANTHEMUMS FOR THE NORTHWEST

Experience in eastern Washington

Harold T. Abbott

THE climate of eastern Washington makes it possible to grow hardy Chrysanthemums of the highest quality. The winters are not too severe. The summers are hot and dry, and so artificial watering is necessary for most gardens.

A display of Chrysanthemums covering about 6,000 square feet is a feature of the Duncan Gardens in Manito Park, Spokane. The soil is volcanic in origin, combined with river silt and sand. The Chrysanthemum beds slope slightly north, for protection from the prevailing dry southwest summer winds. The selection of varieties is restricted to those which bloom before the expected frosts of early October, although in some years frost comes much later. The earliest varieties

commence to bloom in August, and the entire month of September is made attractive by the great Chrysanthemum display.

Culture

It is the practice of the park authorities to lift stock plants in late autumn, and to propagate new plants from cuttings under glass in late winter. The average amateur, however, leaves his plants in the border, and gives them a light protection such as evergreen boughs.

As intense heat may be expected in late May and June, it has been a custom in the Duncan Gardens to plant, between the Chrysanthemums, blooming-size plants of the biennial Canterbury Bells (*Campanula calycanthema*, a race of *Campanula Medium*). These give just the amount of shade needed to keep the ground cool while the Chrysanthemums are developing good crowns. By the time the Canterbury Bells have finished their bloom, about July 15, the Chrysanthemums are large enough to fend for themselves. The last safe date for pinching back Chrysanthemums is about July 10 to 15. The plants are fertilized at this time, and flowers open about August 10.

Late yellow Chrysanthemum Eugene A.
Wander

McFarland photo



Varieties

By August 20, many of the Chrysanthemums begin to show a good deal of color. Pink Cushion (or Amelia) is among the first. Also showing early are the following varieties: Silver Spoon, Snowfall, Mme. Chiang Kai Shek, Bennett Pompon, Harbor Lights, Glory Mum, September Yellow, King Cup, Canary, and Zantha. August is a month of continued hot days, but cooler nights. It is during the heat of the day that many of the early blossoms suffer from scorching, especially those of Silver Spoon, Snowfall, and September Yellow. Partial shade in the late afternoon is advisable for early varieties in this locality.

About the beginning of September, there is a sudden bursting into bloom of almost all of the other varieties. In 1947, September was deficient in rainfall, but irrigation developed the Chrysanthemums to perfection. The predicted early frosts failed to materialize, and on October 15 the following notes were made concerning the best of the reliable varieties.

WHITE

Snowfall: the best of the true whites in the collection at this time; 20 inches.

September White: continues to bloom well; requires careful staking; 24 inches.

Silver Spoon: one of the earliest; no scorching after the first blossoms; still blooming heavily; 20 inches.

Swansdown: blooms heavily, is early, but is not long-lasting; is easily injured by water on the petals; 18 inches.

Crusader: a truly excellent large white Chrysanthemum with a slight pink tinge at the base; somewhat late for Spokane; 20 inches.

YELLOW

Canary: a yellow Swansdown in habit of growth and period of bloom; 16 inches.

Button Chrysanthemum Judith Anderson

McFarland photo



Harbor Lights: an excellent pale yellow; well liked.

Glory Mum (or **Golden Glorymum**), **Glory of Seven Oaks** (or **Carrie**), **Golden West:** all excellent, but almost entirely out of bloom by this date.

September Yellow: like September White, it is early, heavy-blooming, and showy for a long period; it requires careful staking; 24 inches.

Gold Standard: tall; long season, with large showy blossoms on sturdy stalks; 36 inches.

Primrose: the choice of the public; large specimen blossoms on stalks of real substance; long season of bloom; 30 inches.

Eugene A. Wander: the best late yellow; is heavy-blooming and resists frost well; 20 inches.

Judith Anderson: best button Chrysanthemum of the season; 18 inches.

King Cup: favored along with Gold Standard; excellent; 24 inches.

Jean Harlow: a small amount of shade made the blooming season too late; 24 inches.

Morning Star: a pale yellow to creamy white of excellent form, foliage, and lasting quality; very popular; 16 inches.

PINK-LAVENDER

Lavender Lassie: excellent for planting in large masses; good quality, with small blossoms on long wiry stems; 18 inches.

Silver Queen: actually gives the effect of a silver sheen; blooms heavily, and is excellent for bedding purposes; 18 inches.

Modesty: too late to be reliable; just commencing to bloom at this date; 30 inches.

Gertrude: most popular of the large but medium-height Chrysanthemums; 24 inches.

Connie Hall (24 inches), **Juliana** (30 inches), **Una** (24 inches), **Rosy Morn** (24 inches): all of these have done well, and are recommended for use during the 1948 season.

BRONZE

Mme. Chiang Kai Shek: bloomed early and heavily; now almost entirely out of flower; 20 inches.

Bennett Pompon: low and compact; has a long season of bloom; 18 inches.

Alberton Beauty: tall-growing; in excellent condition; blossoms orange-yellow, changing to bronze.

Ella Friend (24 inches), **Orange Glow** (30 inches), **Mrs. Smeardon** (24 inches), **Corona** (24 inches): four of the best bronze Chrysanthemums for Spokane.

RED AND MAROON

Coppelia: red-bronze; fading to a yellow-bronze; 24 inches.

Tiger: excellent in combination with Coppelia; 24 inches.

Daily Express: good in combination with Mrs. Pattie, Mrs. Smeardon, and Conqueror; 20 inches.

Late Chrysanthemum Burgundy

McFarland photo



Mrs. Pattie: a long-season Chrysanthemum; appears to be especially hardy; a real favorite; 24 inches.

Conqueror: high in popularity along with Tiger, Primrose, Gold Standard, Snowfall, etc.; 36 inches.

F. F. Rockwell: rather late in Spokane; should not be used in any but the most advanced locations; popular among visitors of 1947; 30 inches.

Burgundy: late but reliable; resistant to first severe frosts; its deep wine color is admired by everybody.

Petunia: in bloom along with Burgandy, but to be fully appreciated should be planted at a distance from Burgandy. By comparison, Burgandy is voted the favorite because of its predominating red color.

Chrysanthemum Orange Glow



McFarland photo

MORE ABOUT MOWING FLAWN

In response to the invitation for experienced comment in PLANTS & GARDENS, Summer, 1948, page 123

I believe that the recommendation of frequent (short) mowings of *Zoysia Matrella* for greater resiliency to heavy foot wear is sound. I have, in Decatur, Georgia, a lawn that is part in shade, part in sun. The latter portion we mow once weekly, and it appears to withstand the heavy tracking we make over it. The unmowed portion (still formative) seems brittle at the crowns, crackling and sometimes breaking off under foot. This is more noticeable in the shadier areas. Either mowed or unmowed, though, I am ever more impressed by the resiliency of *Zoysia* turf. I still find it best to set the mower blade fairly high so as to avoid cutting below the green leafage. Frequent mowing speeds the spread between

clumps, and may slightly hasten the filling in between sod blocks to a solid, even sod—a slow process with Flawn.

Zoysia, when worn out, is slow to recover. Abundant moisture and protection from foot wear are important to encourage new shoots from the trodden roots. At Bok Tower, Florida, during the summer, we were able to keep visitors off such convalescing lawn areas by setting rotary sprinklers over them for hours—which was as effective as fencing and much more sightly! This should work well on damaged *Zoysia* stands in parks; *Zoysia* can take an inordinate amount of water in the summer.

WINTON H. REINSMITH.

WILL IT BLOOM THE FIRST YEAR?

Yes—if it's an annual!

John C. Wister

WHILE there may be some extenuating circumstances which make it necessary to sympathize with people who want fast-growing trees to put in new and barren places, it is hard to find any excuse for those who ask the question "Will it bloom the first year?" when any flowering tree, flowering shrub, or herbaceous perennial is mentioned. Whether or not it will bloom the first year is not the point—where these plants are concerned.

Anybody who wants plants to bloom the first year can have them for the large sum of 5 or 10 cents, by buying a package of seeds of Zinnia, or Petunia, or Nasturtium, or any one of a hundred other ordinary, commonplace, but lovely and beautiful annuals. There are plenty of them, more than any single garden can hold. But to link that question with any permanent plant is enough to make a real gardener utterly discouraged.

Why not be willing to wait a while for something that is good? Why not plant the right size, and wait two years, as is necessary with most perennials—or three to five years, as may be needed with Peonies, to get them well established? The late T. A. Havemeyer, long president of the Horticultural Society of New York and one of the greatest growers of Lilacs this country has ever had, often remarked that no one could tell the worth of a Lilac in less than ten years. I think of that every time a person asks me, "How soon will this Lilac bloom—will it bloom the first year?" It is hard to say to such a person that if the Lilac should bloom the first year, probably the best thing to do would be to cut off the flowers before they opened.

I cannot see the hurry: there is always the Nasturtium to fall back on. It is a beautiful flower, and I am very fond of it. Let us use it more, while we are waiting for the more permanent plants to develop; but let us not confuse the two values.

Flowers and leaves of Nasturtium

Elsie M. Kittredge photo





Unwin's Hybrid Dahlias

Grow from seed, and bloom the first year

Dolgo Crab Apple
A seedling of
Siberian Crab Apple
(*Malus baccata*)



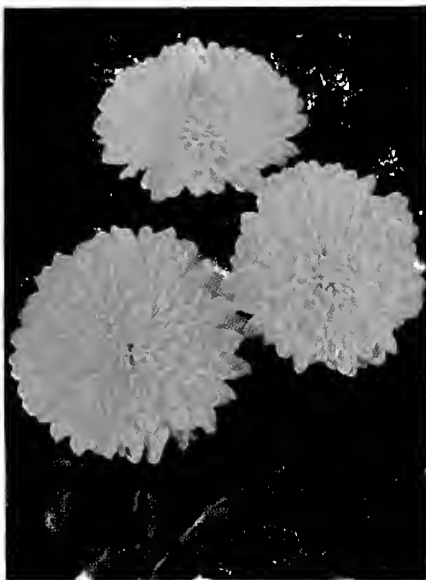
(*Euonymus Fortunei* var. *vegetus*)
A low spreading variety.



Garden Chrysanthemums

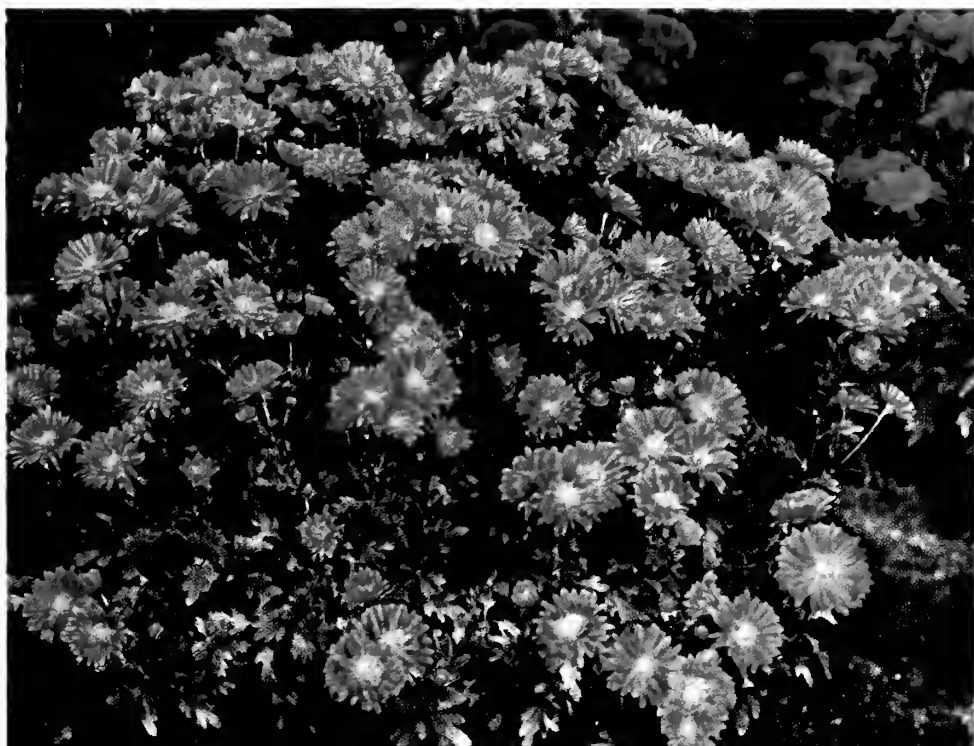


September Bronze



September Gold

Chestnut Burr





Hardy Aster Harrington Pink

A variety of the
New England Aster
(*Aster novae-angliae*)



Hardy Aster Goliath

A variety of
the Rock Aster
(*Aster alpinus*)

THE DOLGO CRAB APPLE

This plant was raised by Professor Niels E. Hansen, whose article on the breeding of extra-hardy plants appeared in *PLANTS & GARDENS*, Spring, 1948. It was raised from Russian seed in 1897, and introduced into commerce in 1917. It has single white flowers about 2 inches wide. The fruit is bright red and a little over an inch in diameter. The plant is valuable as an ornamental both in bloom and in fruit; but it is recommended for planting chiefly for its fruits, which are good for making jellies and preserves.

Like all Crab Apples, it is easily grown, is a reasonably quick grower, and comes into fruit as a comparatively young plant. Having been introduced only a little more than thirty years ago, there are no very

old plants by which to judge how tall it will eventually grow.

Many amateur gardeners like to grow ornamental Crab Apples from seed; and it is true that seed from this variety may give plants of ornamental value. But it cannot be too strongly emphasized that scarcely any Crab Apple can be grown *true to type* from seed; and that seed from any fine ornamental or economic variety has little chance of producing a plant as good as the parent. Most of the Crab Apples now being grown are selections from many hundreds or thousands of seedlings. Dr. Hansen reported in 1927 that he had grown fully ten thousand such seedlings.



EUONYMUS FORTUNEI VAR. VEGETUS

This fruiting form (see illustration on title page) of the well-known evergreen vine, *Euonymus Fortunei* (better known by its old and more descriptive name *Euonymus radicans*), is one of the hardiest of low-growing vines or ground covers, and is particularly useful in all sections where English Ivy does not endure the winters. It grows well also in milder and warmer climates; but it is more subject to *Euonymus* scale in the middle and southern States than in the North.

Sprouts of this fruiting form appear

spontaneously on older plants of *Euonymus Fortunei* (just as the fruiting form of *Hedera Helix arborescens* appears on older plants of English Ivy). The plant is propagated by cuttings from these fruiting forms, and will not come true from seed. Different plants vary in the height to which they will climb, if supported; but if not supported, they will be shrubby and stay close to the ground. The plant was introduced from Japan into the Arnold Arboretum by William S. Clark, President of Amherst College, in 1878.

HINTS ON FALL PLANTING OF BULBS

Time, depth, spacing, soil

Bess L. Shippy

Daffodils

THERE is a special delight in bulb planting time. The main task of bulb planting begins with the Daffodils. The standard advice is to put these into the ground in the early days of September (to enable them to make roots in the fall); but they have a wider tolerance for time of planting than is generally realized. The bulk of the crop, coming from abroad, can scarcely be harvested

and dried for shipping in time to reach our shores before the middle of September; and so the majority of bulbs are planted nearer the end of the month; even mid-October still allows time for root growth. While the average depth to plant is 5 inches, this is varied according to whether tiny species are being planted or huge double- or triple-nosed bulbs such as Trumpets. There is a limit, though, to the depth at which Daffodils do well. If planted too deep, they lag in emergence from the soil in the spring and do not have well-developed foliage by the time they bloom.

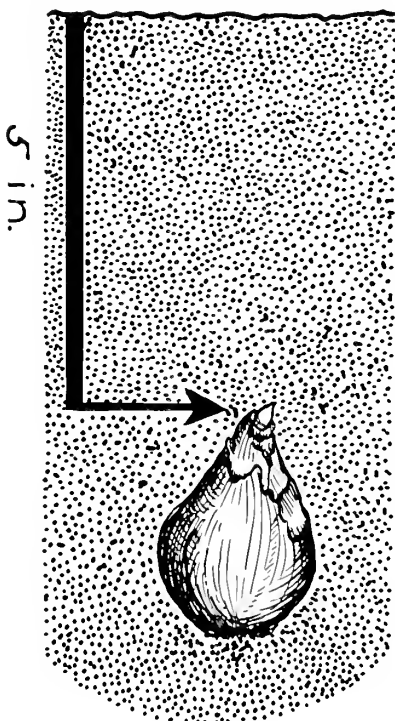
Tulips

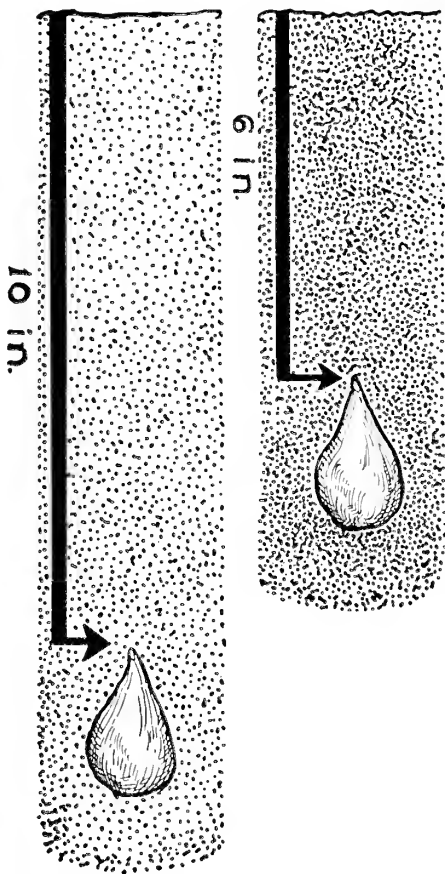
We like to use the deep method of planting Tulips, setting them from 8 to 10 inches down. This works well in our sandy, well-drained loam, but is not to be recommended for all soils or locations. Where it can be employed, it has advantages; the bulbs persist for many years, much damage by moles and mice is avoided, and it is easier to dig over the beds after the foliage is gone.

While most gardeners like to have their Tulips planted in early November, experience shows that these bulbs may be planted much later without injury. In fact, an authority in New York State, who wrote a widely-read book for florists some years ago, describes a planting made at the end of November as the finest he had ever seen, and went on to say, "Not having made much roots in the fall, there was younger, fresher, and more vigorous root action when the bulbs were flowering, and that sustained the flowers a week longer than is usually the case."

In the heavier soils, 5 to 6 inches is a proper planting depth. In any case, the soil under the bulbs should be dug to a depth of 15 to 20 inches to incorporate whatever it may need. If it is too heavy,

Average depth to plant Daffodil bulbs





Depth to plant Tulip bulbs: left, in sandy soil; right, in heavy soil

add materials to aerate it; if too light, add humus, to act as a sponge for holding moisture. It is useless to plant bulbs at all unless proper drainage can be provided, for without that, they will either fail to grow at all or be sickly.

We are great believers in home-made compost, and sprinkle a light coating over the bulb beds annually. Aside from this, the safest thing to use is bone meal—from 1 to 2 ounces to the square yard—applied evenly and forked in, or dusted over and lightly raked in. As it disintegrates slowly, the bulbs are not overstimulated at any one time.



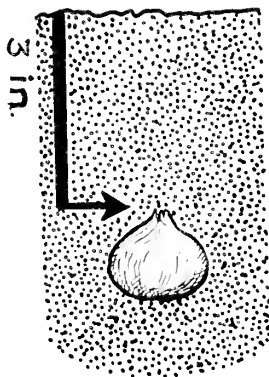
McFarland photo

Squills (*Scilla sibirica*)

Smaller Bulbs

Squills (*Scilla sibirica*) and Glory-of-the-snow (*Chionodoxa*) should be set 3 inches deep and 2 or 3 inches apart, in a place where they may remain undisturbed to form little colonies. It is only after they have had time to make sheets

Correct depth to plant Squills, Glory-of-the-snow, and Snowdrops





McFarland photo

Winter Aconite (*Eranthis hyemalis*)

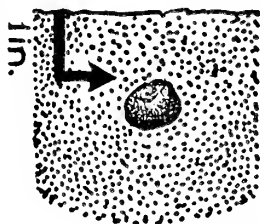
of blue that their full beauty is realized. They do not require rich fare, but do thrive on a top-dressing of compost or of very old, well-rotted manure every year or so.

Some of the smaller bulbs need to go into the ground very early in the fall. Chief among these is the Winter Aconite (*Eranthis hyemalis*). The bulbs, which

look like nothing more than tiny clods of earth, seem almost to petrify when allowed to dry; they are then, of course, worthless. They should be planted about an inch deep the same day they are received. The plants look best in little drifts under shrubs. The new hybrid, *Eranthis Tubergenii*, is a great improvement on the type.

In early garden books Snowdrops (*Galanthus*) were called "Bulbous Violets." With their stems as smooth and green as jade, and white flowers the size of closed violets, they stand alone to herald the spring. And indeed it is hard to imagine anything that would enhance their beauty. They naturalize easily, even in a heavy soil. About 3 inches is the correct depth to plant them.

Snowflakes (*Leucojum*) are similar to Snowdrops, but larger and more robust in every way. It is well that this is so:

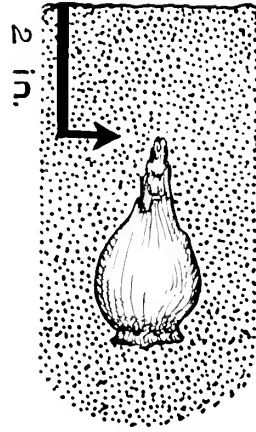


Proper depth for planting Winter Aconite

for unlike Snowdrops, they do not arrive upon a thinly populated scene, but must compete with other later arrivals. A sandy loam soil suits them to perfection; and a position where they may have the morning sun is best. After they are planted (about 2 inches deep) they should be disturbed as little as possible.

From early September till late November various bulbs may be set out, to bring beauty and color to the garden in the spring.

Other articles on fall bulb planting were published in *PLANTS & GARDENS*, Autumn, 1947.



Proper depth for planting Snowflake

Snowflakes (*Leucojum aestivum*)

McFarland photo



NARCISSUS CLASSIFICATION

Essentially as published by the Royal Horticultural Society

Division 1. TRUMPET DAFFODILS: trumpet or crown as long as or longer than the perianth segments.

- (a) Varieties with yellow trumpet and yellow perianth.
- (b) Varieties with white trumpet and white perianth.
- (c) Bicolor varieties, having a white perianth and a yellow trumpet.

Division 2. INCOMPARABILIS (large cups): cup or crown shorter than the perianth segments, but not less than one-third their length.

- (a) Yellow, with or without red coloring on the cup.
- (b) Bicolor varieties, with white perianth and yellow or reddish cup.

Division 3. BARRI: cup or crown less than one-third the length of the perianth segments.

- (a) Yellow, with or without red coloring on the cup.
- (b) Bicolor varieties, with white perianth and yellow or reddish cup.



Trumpet



Incomparabilis



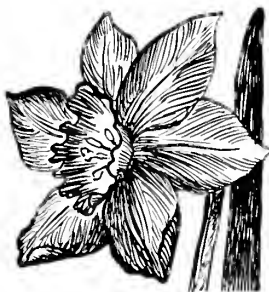
Barri

Division 4. LEEDSII: perianth white; cup or crown white, cream or pale citron, sometimes tinged with pink or apricot.

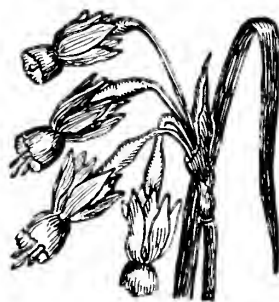
- (a) Cup shorter than perianth segments, but not less than one-third as long.
- (b) Cup or crown less than one-third the length of the perianth segments.



Leedsii (a)



Leedsii (b)



Narcissus triandrus

Division 5. TRIANDRUS HYBRIDS: all obviously derived from *Narcissus triandrus*.
 Division 6. CYCLAMINEUS HYBRIDS: all obviously derived from *N. cyclamineus*.
 Division 7. JONQUIL HYBRIDS: all obviously derived from jonquils (e.g. *Narcissus Jonquilla*, *Narcissus juncifolius*, etc.).

Division 8. TAZETTA (Garden Forms and Hybrids)

To include *Narcissus Poeticus* varieties (hybrids, *Narcissus poeticus* × *Tazetta*), the Dutch varieties of polyanthus *Narcissus*, and *N. biflorus*.



Narcissus cyclamineus



Narcissus Jonquilla



Tazetta



Division 9. POETICUS VARIETIES



Division 10. DOUBLE VARIETIES

Division 11. VARIOUS

To include *Narcissus Bulbocodium*, *N. cyclamineus*, *N. triandrus*, *N. juncifolius*, *N. gracilis*, *N. Jonquilla*, *N. Tazetta* (wild forms), *N. viridiflorus*, etc.

Narcissus Bulbocodium



Narcissus gracilis

Narcissus viridiflorus



EARLY VARIETIES OF DAFFODILS

Beginning the blooming season in late March

John C. Wister

IN growing plants, one should choose varieties that will give as long a succession of bloom as possible. Many gardeners make the mistake of having varieties which bloom all at the same time. This mistake often comes from visiting good collections and making notes of plants that are in bloom on the same day, consequently ignoring varieties which have bloomed earlier and others which will come into bloom later.

Classification

The various daffodil classifications, made in the past, have been concerned only with the form and color of flower. Early classifications were based on two wild types: the trumpet type, native to northern Europe, and the poet type of France and Switzerland. Botanists, who liked to use Latin, formerly called these "magni-coronati" and "parvi-coronati." These terms are no longer in common use. Hybridization between these types has given rise to many varieties intermediate in form, which do not fit into either group; and plant exploration has brought into gardens many intermediate types, which at first were called "large cups" or "small cups."

The large cups were reclassified under the inconvenient term, "incomparabilis"; and the small cups were named "Barri," after Peter Barr, the great English seedsman and daffodil grower. Later the all-white varieties were split off: the small-cup one being called "Leedsii" (in honor of Edward Leeds, an English daffodil breeder of a century ago); and the larger ones designated as "Giant Leedsii." This left out entirely the hybrids of small

species such as *Narcissus Jonquilla* and *Narcissus cyclamineus*; also double varieties, and the artificial hybrids between the poet group and the tender bunch-flowered species.

The Royal Horticultural Society published various classifications, each of which became outdated. The 1923 classification, which still stands, but may be changed in 1949 or 1950, is given on the preceding two pages.

None of these classifications has taken into consideration the blooming season. It is my purpose in these articles to suggest (1) some extra-early varieties, which will bloom in late March and up to the middle of April (in the Philadelphia and New York areas); and (2) some extra-late varieties which will not come into bloom (in those areas) before the first week in May and will last to May 15 or 20 or even later. The addition of these two groups assures a season of some six weeks to two months, and overcomes the usual complaint that daffodils bloom only a short time; this complaint applies only to the mid-season varieties which (in this area) come mostly between April 15 and May 1.

Early Varieties

The very earliest to bloom are some small and rather delicate species and wild types that are suitable only for rock gardens. Among these are *Narcissus minimus*, *minor*, *cyclamineus*, and *lobularis*. I have had these in bloom before the middle of March.

Reliable early varieties for the garden can be in bloom (in this area) about March 25; the earliness depends upon where they are planted. On a south slope protected by buildings, the flowers come a week or two earlier than in exposed situations. For earliest blossoms choose February Gold or March Sunshine,



McFarland photo

February Gold, a *Narcissus cyclamineus* hybrid

both *Narcissus cyclamineus* hybrids and much alike. March Sunshine is more graceful, and opens two or three days later.

Much better known was the large-cup variety, Sir Watkin. It was naturalized by the thousands in many fields and

woodlands. It was strong-growing, free-blooming, and thoroughly reliable. It did not, however, have the quality of some of the newer kinds such as Fortune, Jalna, Carlton, or Whitely Gem. These should be added by those who wish to have a few bulbs of some newer kind.

There are several early trumpets which follow very shortly after the large-cup varieties mentioned. Silvanite and Jesta are pale bicolor varieties.

Among the real yellows, The First is supposed to be the earliest; but it is no earlier than Aerolite. Both are inexpensive. More expensive varieties are Erna Rubinstein, Statendam, Duchanel, and Elgin.

There are only two white trumpets that come as early as the varieties men-

tioned. One of them, Snowflake, dates back to 1890; it has apparently been discarded by all commercial growers and has become a "forgotten" daffodil. I have kept it because it comes early and because it has few competitors. Alice Knights is much better known. Neither of these varieties is particularly strong-growing.

There are many large-cupped white varieties with cups so large that it is often difficult to tell whether they should be classified as trumpets or as Giant

Trumpet Daffodil Aerolite

McFarland photo



Leedsiiis. They grow well and are extremely beautiful. The oldest, Mermaid, dates back forty years, and like Snowflake has been dropped by the commercial growers. I have had it for many years, and it has bloomed consistently and grown well. More modern varieties, no longer high in price, are Silver Star, Daisy Schaeffer, and White Nile; more expensive are Moray, Niphetos, Naxos, Brunswick, and Truth. While these may be a good deal alike, I believe that all of them are worth keeping: they come between April 1 and 15 (in this area); and we need white varieties in the early season.

Most of the varieties offered in dealers' catalogs reach their height (in this area) between April 20 and 25. During that week the flowers are the most spectacular. In this mid-season group the greatest advances have been made in color range and color combination. Also in this group the flowers of finest quality and best texture and substance are to be found. There are many to choose from; but nearly all the ones now offered for sale by specialists and by the best dealers are good varieties worthy of a place. A possible criticism is that there are too many which are too much alike; it is difficult to know which to select.

MID-SEASON DAFFODILS

New light on a few of the many that are available

Charles H. Mueller

IN considering the almost unlimited array of mid-season Daffodils, the phrase "embarrassment of riches" comes to mind; yet I do not find it in the least embarrassing to contemplate the wealth of beautiful bloom which these lovely flowers bestow, at their height, in manifold variations of form, size, and color.

By mid-season varieties I refer to those that bloom in the New York-Philadelphia area sometime during the period from April 15 through the first week of May, depending on the season. There are now available to gardeners literally hundreds of fine new and old varieties that flower during this period. Naturally, any discussion which does not run on endlessly must be limited to part of them and must omit many good ones. The task of selection is further complicated by the

fact that each year scores of new varieties are introduced, many of which deserve a permanent place in any good collection.

Many a person is unfamiliar with the amazing range of variation in the form and color of Daffodils, and thinks of these flowers vaguely as pretty, yellow or white-and-yellow flowers that bloom in the spring. Such a person often wonders that there can be so many kinds listed in even a small catalog without duplication. But as he wakes up to the many-faceted beauty of the Narcissus, he realizes that there are more possible combinations of form, size, and color in this flower than there are hands at bridge. Of two kinds whose perianths and crowns are both golden yellow, one may have a wider crown than the other, with perhaps a more heavily frilled brim; or the perianth of one may be flat and overlapping, while that of the other is flaring and pointed. Here may be two varieties, each with white petals and red-edged cup; but notice carefully whether the red margin

is deeper and broader in one than the other, and whether the cup is fluted in the first and straight in the second.

Such subtle variations are in addition to the differences officially recognized in the presently accepted Royal Horticultural Society classification of *Narcissus*. Yet I find it very helpful to think of my Daffodils as belonging to certain color groupings beyond the official categories and their subdivisions—especially when considering those included in the first four divisions, to which most mid-season varieties belong: the Trumpet, *Incomparabilis*, *Barri*, and *Leedsii*.

Trumpets

For example, I think of the all-yellow Trumpet Daffodils as falling into at least two groups: the golden yellow kinds, like

Trumpet Daffodil King Alfred

McFarland photo



King Alfred; and the lighter, primrose-yellow varieties, like old Emperor. King Alfred, for all its universality, is still a magnificent flower when well grown from healthy bulbs, and I should never omit it from my collection. Its size is imposing, and its large, flanged and heavily frilled trumpet is beautifully proportioned in relation to its broad perianth. Its color, however, has a brassy tone, which seems to be more emphasized when it is planted with Primroses or primrose-colored Daffodils. Face it down with a large fore-planting of deep blue Grape-hyacinths (*Muscari armeniacum*), and it shows a striking note of gold. Opening early, it has a long season of bloom; but, like all golden yellow Trumpets, King Alfred refuses to naturalize. It needs a sunny spot in good, well-drained garden soil; and even then it does not repeat too well.

Among the newer golden Trumpets, *Diotima* is the most spectacular. This majestic flower has long, starry perianth parts of a size to match its huge long trumpet. It is uniform deep yellow, with just a touch of chartreuse. Golden Harvest, which is rapidly becoming very popular and plentiful, is undeniably impressive because of its fine size and substance; but it is not so well proportioned as King Alfred. Lord Wellington is a well-formed Trumpet of outstanding size, but I have not found it a very reliable grower.

Perhaps the best-proportioned golden Trumpet is Burgomeester Gouverneur. While not so large as *Diotima*, it has perfect form and substance and appears to be a strong grower. Its color is deep, but it has absolutely no tone of brass. This year I grew for the first time a variety called Senior. This large Daffodil I thought remarkable because it was not merely golden yellow, but its huge, heavily frilled trumpet had a tone of orange.

Among the lighter yellow Trumpets, Emperor was justly the favorite for many years; but it has ceased to be a good commercial grower, and is becoming less

easily available. Adequate to take its place and superior in its own right is Aerolite, a primrose-yellow flower with a little deeper trumpet. Aerolite has fine size and substance and perfect show proportions. More than that, it is a robust grower and a splendid naturalizer.

The all-white Trumpets I divide into two groups: those whose trumpets turn snow-white, and those whose trumpets remain cream or ivory. Of the first group, Beersheba and Mount Hood should both be planted. Beersheba has a long, fluted trumpet, and nods slightly. The trumpet of Mount Hood is broader at the mouth, stands out perpendicular to its strong, straight stem, and is framed by a broad, overlapping perianth. Roxane is large and has a clear white color; but its broad, irregular trumpet is coarse by comparison with Beersheba and Mount Hood.

Imperator is the largest Daffodil with ivory trumpet, and in fact, is one of the largest and most beautiful in the all-white category. Mrs. Krelage, which not many years ago was the best white purchasable at less than a king's ransom, has been surpassed many times by newer kinds; but it is still worth growing. It has an attractive tubular trumpet with rolled brim.

Clearly outstanding among the bicolor trumpets is the new variety Patria. Its perianth is snow-white, broadly overlapping, and perfectly formal. It has a long trumpet, frilled at the brim, of warm yellow. Patria has an extremely long season of bloom; it lasted three weeks this season in my garden. President Lebrun is another striking bicolor. Its shining white perianth frames a large trumpet, heavily frilled and expanded at the mouth, of deep yellow, almost buff in soft lights.

Incomparabilis

The Incomparabilis section is officially divided into those with yellow and those with white perianths. Of the scores of truly remarkable hybrids in this division,

some have all-yellow crowns like old Sir Watkin, but most of the new ones have red or orange-red in their crowns.

Carlton is still one of the best of those whose perianth and crown are both yellow. Its broad petals are clear primrose, and its wide crown of deep yellow is heavily frilled. It opens early, but outlasts many later varieties which come and go during its long blooming period. Havelock is a fine, tall, clear yellow; and Monte Carlo is worth having for its unusually deep color. The new Daladier has an interesting feature in that its cup, which opens warm primrose, actually deepens to orange-yellow as the flower ages.

When speaking of the outstanding red-cupped Incomparabilis kinds, it is difficult to stop, as each year brings ever

Yellow Poppy, an Incomparabilis Daffodil

McFarland photo



finer ones. This year we were impressed by Bond Street. Its huge broad crown is heavily crinkled and frilled at the edge, with a wide margin of rosy orange, and is framed by a sulfur-primrose perianth 4 inches wide. Aranjuez is another fine new Incomparabilis, with pale yellow perianth framing a wide, red-edged crown.

Carbineer, El Dorado, Ramillies, Red Marley, and Orange Flag are other excellent Incomparabilis Daffodils with

more or less red in their crowns. A unique variety is Dillenberg, which has flaring petals of deep yellow and a vivid orange-red crown. The foliage spears rise above the flower; this would ordinarily be a serious defect, yet so bright is this flower that the sight of it among the tips of its gray-green leaves is exceedingly fascinating. One of my old favorites is Yellow Poppy, whose refined cup is delicately margined apricot. I have always fancied this soft primrose

Tunis, a Daffodil of the Leedsii division

McFarland photo



Daffodil next to the pink Mrs. R. O. Backhouse.

In the division of *Incomparabilis* Daffodils with white perianths, the number of beautiful varieties is likewise legion. Here, too, the hybridizers have favored red cups, although there are a few good ones with clear yellow crowns. Among these *Polindra* is especially lovely; its clean white perianth measures 4 inches across, and it has a broad, prettily fluted cup of clear lemon yellow.

For many years there was no variety closely similar to John Evelyn. This variety has a broad white perianth and a uniquely heavily crested crown of lemon yellow. Now a number of seedlings have appeared, which are distinct improvements and extraordinarily beautiful. The Duke of Windsor is perhaps the most famous, having triumphed at many shows in the past two years. This Daffodil has a broad crested crown whose edge deepens to orange, then turns light yellow as it matures. In a clump this gives the appearance of flowers with varying degrees of orange in their crowns. Mary Blonck has a white perianth, but otherwise shows little resemblance to its parent. The crown is vividly margined red, and the perianth recurves in the manner of *Franciscus Drake*. *Smaragd* most resembles its parent in coloring, and is, we think, the finest John Evelyn seedling. Three of this group with yellow perianths are *Leviathon*, *Majarda*, and *Rene de Chalons*.

After trying new ones each year, for a fine white *Incomparabilis* with red crown I still fall back on *Dick Wellband*. True, its large flat crown is a bit irregular, but it has a deep satisfying redness and resists the sun. *Scarlet Leader* undoubtedly has a more perfect form, and is a superior show Daffodil; but it burns more readily. *Fancheon*, *Firebird*, and *Franchot Tone* are splendid new kinds with yellow cups brightly margined red, while *Semper Avanti* simply exudes fine substance.



McFarland photo

Thalia, a *Triandrus* variety

Barri

The Barri varieties, whether with white or yellow perianths, all have red-edged cups. Among those with yellow petals, the new *Reginald Dixon* is remarkable for its size and for its large, flat crown broadly margined rosy orange. *Edward Buxton* has a deep yellow perianth and a neat cup, crisply edged red, which endures the hot sun. *Mangosteen* and *Spring Beauty* are bright Daffodils with vivid orange cups backed by warm yellow petals. *Afterglow* should never be missed by those who appreciate perfection of form and delicacy of coloring.

The white Barris include attractive varieties with small, but intensely vivid red cups; but most of them come so late as to miss the mid-season category. *Firetail*, *Hades*, *St. Louis*, and *Verger* flower as the season goes into its late stage; but all of these should be in a good collection. A new variety of striking beauty, which blossoms earlier than the foregoing, is *Kansas*. It is a tall, well-formed flower, $3\frac{1}{2}$ inches across. Its flat, white perianth frames a most appealing

cup of apple-green margined orange-apricot.

Leedsii

The Giant Leedsii division contains varieties with white perianths and medium-large crowns which are also white or creamy white. It happens to contain, also, some of the loveliest varieties of the Narcissus genus. What would a Daffodil garden be without Gertie Millar or Tunis? Gertie Millar has a broad crown of ivory with just a hint of flesh tone. Tunis, with its pale copper brim, is still unique in that there is no other variety of similar coloring. Grayling and E. H. Wilson (Betsy Penn) are other fine Giant Leedsii's, as are the earlier Daisy Schaeffer, Silver Star, and White Nile.

A new group of Daffodils of increasing fame has also been classified in the Giant Leedsii division—the new “pink” Daffodils. For many years Mrs. R. O. Backhouse has held sway as the most famous “pink” Daffodil. Now it must make way for a new and remarkable group of its seedlings which are just coming on. It must be emphasized that the pink in all of them is confined to the

crown—they all have white perianths. And the new grower of them should not expect a flaming rose. Mrs. Backhouse and its seedlings all open with crowns of buff, which gradually turn apricot, then pink in varying degrees of intensity. Siam is the earliest of the new seedlings, and has the widest crown. It is followed by Pink Select, which has a markedly crinkled brim. Lady Bird has the longest crown—practically a trumpet—and the inside is a very satisfactory rose-pink. Pink Delight has a deep pink brim; and Louise de Coligny is notable for its fragrance.

Triandrus and Cyclamineus

The *triandrus* species has given us some splendid and garden-worthy varieties. Justly popular is Thalia, with its three to four starry flowers of pure white. Thalia is tall, and naturalizes well. Elizabeth Prentice is a chaste Triandrus, with generally but one blossom per stem, and is not too tall for the rock garden. Shot Silk is remarkable for the large size of its flowers, as is Silver Chimes. This latter variety has flat, creamy white flowers, and very broad strap-like foliage of an unusually dark green.

The Cyclamineus division is confined chiefly to very early-flowering sorts, but the Jonquil category contains a number which bloom at the height of the season. With one exception (White Wedgewood) they are all yellow and cluster-flowering. Trevithian produces greenish yellow clusters in abundance. Golden Perfection generally has but two enormous flowers on very tall, straight stems. Golden Sceptre has a very deep color, and often has one late flower opening four weeks after the first shows color.

Poetaz and Poeticus

Most of the Poetaz Daffodils come too late for mid-season; but Glorious opens earlier, with two or three large flowers, having red-rimmed eyes backed by white petals. Red Guard also has few and large flowers, which are deep primrose with

Poetaz Daffodil La Fiancee

McFarland photo



vivid scarlet cups. Halvose has five to seven small flowers, with sulfur petals and small orange cups; while La Fiancee has numerous flowers, white with orange-red cups.

The Poeticus Daffodils are known for the lateness of their flowering season. However, the newer Mrs. H. I. Pratt opened this year in time to catch the last of the mid-season varieties. It has remarkable broad white petals and a vivid red-rimmed eye.

Doubles

In recent years a good deal of attention has been won by the new double Daffodils. For enormous size the full yellow double Valencia has no equal. Insulinde has deep orange petals interspersed with yellow, and is a more attractive flower than the ubiquitous Twink of similar coloring. The most attractive doubles are white or nearly so. Mary Copeland has orange petals interspersed with white; Irene Copeland is white with pale yellow petals. A beautiful new double is the snow-white Mrs. William Copeland. If you use only one double Daffodil to round out your collection, let it be this one.



McFarland photo

Mary Copeland, a Double Daffodil

LATE VARIETIES OF DAFFODILS

Extending the blooming season to late May

John C. Wister

Because the mid-season varieties often go by quickly in a warm spell, I am particularly fond of the late varieties that give fine bloom between May 1 and May 10. The first to be considered is the true *Narcissus Jonquilla* (often sold as *Jonquilla simplex*). It is difficult to get this true to name; and some dealers supply Campernelle or some similar form which comes in mid-season. The true

jonquil opens some flowers in mid-season, but its greatest display is after the first of May. It is the most fragrant of all daffodils, and one of the most charming. It does not grow very strongly, and tends to run out unless it is lifted every few years and planted in new ground that has been well fertilized. A little-known and much later variety of the jonquil group is *Narcissus gracilis*. I have seen it begin blooming as late as May 12 and last till May 20 in spite of hot weather. A north slope, with shade to the south and west, is desirable for the latest flowers on the late-blooming varieties.



McFarland photo

A Jonquil hybrid

In the yellow Barri group, numerous late varieties are offered by specialists. Rarity is one of these. Two unusually tall varieties are Red Sea and Mountain Pride. Newer kinds are Cordova, Stam-boul, and Magic Circle.

Among the white Barris, Mrs. Chester J. Hunt was long the best known. It was a splendid flower, but may no longer be available. Other members of this group, which are offered only by specialists in small quantities, are Danger, Sunstar, Vera, Cinderella, Isola, and Picador. They are a good deal alike; and no one would need all of them, except for a very large collection.

The great Irish daffodil breeder, Mr. Guy L. Wilson, has been introducing very late flat-cupped Leedsii varieties. I do not know how many can be had in this country. The oldest are Mystic and Silver Salver. The tallest, Saint Anthony, has apparently been discarded in Europe; but with me it has been exceptionally fine. Newer kinds are Columbine, Dream Light, Gray Lady, Moonbeam, New Moon, and Polar Sea. All are charming flowers; and while they are much alike, each one seems to have a distinction of its own.

The poets, as a group are late. Varieties of them can be selected for extreme lateness; the wild *Narcissus poeticus* var. *recurvus* often continues as late as May 15, but its flowers can not compare in quality with the newer ones which are not quite so late. Dactyl, Dulcimer, and Sonata are splendid. New Irish varieties for testing include Lamplighter, Side-light, and Lights Out.

The old *Narcissus biflorus* has a certain charm, and is a good flower for naturalizing. *Narcissus poeticus plenus*, the old fragrant, double white, is better known under the names "gardenia-flowered narcissus" and "*Narcissus albus plenus odoratus*." In most gardens it is shy-blooming. Much more reliable for blooming, but with less charming flowers are Daphne and Snow Sprite.

Few persons have space for all of the varieties mentioned, or would care to own them all. But even on the smallest place, the gardener who would really enjoy the spring should have a few of the earliest and a few of the late-season daffodils.

Other articles on Daffodils may be found in PLANTS & GARDENS, Autumn, 1947.



TRILLIUMS

Joy of wood and garden

Edwin F. Steffek

giving increasing satisfaction with the passing of time.

Culture

THE Trilliums are among the finest of our native plants. They are a beautiful sight, carpeting the woodland before the leaves come out on the trees; and in addition, they are easy to grow, reliable, and readily adaptable to a sheltered nook near the house. In the home garden they can be planted in the shrub border to lend a "woody" atmosphere, or in groups with some of the smaller spring bulbs. They can also be forced indoors in pots, and planted out afterwards. With simple care they will last many years,

The three principal requirements for the cultivation of Trilliums are shade, moisture, and plenty of leaf mold. The shade of a mixed deciduous wood is best; but most Trilliums can stand evergreen shade or even that of a building, provided it is not too dense. The fairly moist soil must be well drained. Therefore, it is well to incorporate some gravel or sharp sand into the mixture of about equal parts of good garden loam and leaf mold or peat-moss; then keep a perpetual mulch of leaf mold or peat-moss

Snow Trillium (*Trillium grandiflorum*)

McFarland photo



on the soil to retain the moisture, and to provide a continuous supply of humus by its decay.

The plants grow from thick, fleshy roots or "bulbs" (very much like those of the Jack-in-the-pulpit) from 2 to 6 inches beneath the surface, according to the species. Trilliums can be moved at any time of the year, if sufficient care is exercised, but they are best moved in late August or September while they are completely dormant. If they are purchased from a dealer in the spring, they may take from one to two years to recover from their storage.

Left to themselves, Trilliums increase slowly; but they lend themselves readily to artificial propagation. The commonest way, of course, is by seed, which should be sown as soon as ripe in a sandy leaf mold kept moist and shaded. Finely chopped Sphagnum moss mixed with the top layer of soil and sprinkled lightly over the surface will usually help germination. The seedlings generally appear the following spring, and flowering commences about the third season. Division may also be practiced on any that "clump"; and injury to the "bulbs" often results in the formation of numerous "bulblets."

Kinds

Perhaps the best-known and most attractive of all the kinds available is the Snow Trillium (*Trillium grandiflorum*); and it is also one of the easiest to grow. In April or May it produces large snowy white flowers that slowly turn to pink as they age. It succeeds in a neutral soil, and responds well to a little extra care. The leaves lose their attractiveness by the middle of July; hence, a mixed planting with ferns is not only very desirable but doubly attractive. The scarlet fruits are ready in late August or early September.

Another that is popular but not so tractable is the Painted Trillium (*Trillium undulatum*). This one must have acid soil. It blooms a few days later than

the Snow Trillium; and the flowers are smaller, with attractive pink or reddish markings on each petal. In the wild, this one is a denizen of the cooler woods, in company with Clintonia, Hobblebush, Trailing Arbutus, Bunchberry, and Canada Mayflower, all of which can be made to grow in the garden, if given the proper soil.

The commonest of the Trilliums in many sections is the Purple Trillium (*Trillium erectum*); but it is not so popular for growing in large numbers, because of its objectionable carrion-like odor. Nevertheless, it is very attractive when in bloom, and combines well with the large white Snow Trillium. Like most of the species, it is adaptable as to soil reaction, growing in both acid and neutral soils.

The Nodding Trillium (*Trillium cernuum*) is interesting; but it is less showy, because its dainty white flower is not only somewhat smaller but is borne upon a curved stem that bends down and hides it under the leaves. It is easily grown, however, and is suitable wherever the others are.

The Dwarf Trillium, or Small Snow Trillium (*Trillium nivale*), is the first of

Painted Trillium (*Trillium undulatum*)

McFarland photo





McFarland photo

Purple Trillium (*Trillium erectum*)

the eastern species to bloom, sometimes appearing when the snow has scarcely left the woods. Its counterpart, the Oregon Trillium (*Trillium rivale*) of the west coast, is similar but somewhat marked with pinkish, and does not appear to bloom quite so freely when grown in the East.

The Yellow Trillium (*Trillium sessile luteum*) is another very interesting species. Its strangely mottled leaves, and its flowers of a peculiar greenish yellow, never fail to arouse interest. Like the

others, it is not difficult to handle in the wild garden.

The pale pink Rose Trillium (*Trillium stylosum*) is one of the last to bloom, but in most gardens it does not grow quite so strongly as some of the others. Anyone who can succeed with it, however, can stretch the Trillium season to about two months, a fact not known to most persons.

In addition to these, there are numerous other species or "near species," including the charming Pacific Trillium (*Trillium ovatum*), Prairie Trillium (*Trillium recurvatum*), Toad Trillium (*Trillium sessile*), Shy Trillium (*Trillium declinatum*), and *Trillium Catesbaei*, which one might include if he is interested in a collection.

One word of caution: do not plant any Trilliums unless you intend to give them a proper place and the little care they need. True conservation does not mean despoiling the woods, only to have the plants die in cultivation. It is rather creating a surplus and returning it to the woods to help Nature.

SUGGESTION FOR COMMUNITY SERVICE

A civic-minded home grower who raises more plants than he himself needs, can find many opportunities to make his gardening efforts useful to his home town.

In Montclair, New Jersey, the Public Library has been so fortunate as to have the six large flower boxes on the ramps of its front steps filled with plants every spring for perhaps twenty years. For a decade or so a family with a gardener and a greenhouse took the boxes each spring, filled them with white Petunias of their own raising, and returned them to the Library steps. The Petunias flourished in the heat, where the sun beats down against the sidewalk and the front of the building. Since this became impracticable for the family that had ar-

ranged it, the Montclair Garden Club has filled the boxes. Lantanas were used successfully at first; Pansies and Ivy are now being tried.

Flower arrangements within the Library building, or winter arrangements of twigs, greens, and seed heads have also been supplied by Garden Club members; while loose flowers—and even vegetables and fruits—have been left at the Library at times by persons with productive gardens.

In many towns there are no doubt departments in the Municipal Building or in other public buildings which would be equally appreciative of the fresh pleasantness of such gifts.

DOROTHY WAUGH

ALLIUMS

*Easy to grow for summer bloom,
but destitute of common names*

Marion T. Rowley

THE Alliums are a large group of bulbous plants, including those culinary stand-bys the Onion, Leek, Garlic, and Chives, and also offering a variety of plants for the flower garden. Those suitable for gardens vary from a few inches in height to 3 or 4 feet; the flowers, white, yellow, blue, purple, or rose, sometimes star-like, sometimes bell-shaped, appear from late spring through the summer, in loose clusters or in tight round heads. The leaves vary from rather broad ones, in some kinds, to the round type so familiar to gardeners who have to cope with

that sturdy weed, Onion-grass (*Melica bulbosa*).

Garden Alliums are, on the whole, not exacting in their needs; but those that seem to be slow in becoming established grow better in slightly raised beds of sandy loam with some hard coal ashes added. If bulbs are not available, it is easy to grow them from seed. Small species are adapted to rock gardens and other collections of small plants, and several are excellent for edgings. Some are adapted for the border of larger perennials. A few are delightfully fragrant—only a very close sniff revealing the basic scent of onion. Many make good cut flowers. Those that have a tendency to seed themselves to excess can be kept in bounds by removal of the ripening heads.



Allium Moly

McFarland photo

For Edging

Especially fine for edging beds is *Allium senescens* var. *glaucum*, with its swirled gray-green leaves and pale purple bloom toward the end of summer. It is also good for miniature arrangements.

Likewise suitable for edging is *Allium flavum*, a low plant with fluffy yellow flowers, which blooms in early July and seeds easily. *Allium Przewalskianum* and *Allium roscum* are two more for edging. The first, 10 to 12 inches high, has round heads of medium purple flowers on wiry stems; it blooms through most of June. *Allium roseum* is low and delicate, and has flowers of a true rose color in July. It is one to be planted in quantity for cutting.

The low *Allium Moly*, in gardens the best known of this whole group, is a broad-leaved plant with round heads of starry yellow flowers in May. It is adapted to woodland plantings, and will grow even under perennials.

Varieties of Medium Height

Taller than these is *Allium Cyrillii*, which blooms twice even though allowed to set seed. This has a glorified Chive bloom, and dries well for flower arrangements. It blooms early in May, seeding toward the end of June. Closely related is the July-blooming *Allium nigrum* (*speciosum*), an old stand-by easy to grow from seed, and having nice lavender flowers in a round head. *Allium senescens* (*montanum*), of medium height, has attractive gray-green foliage, and round heads of pale lavender stars opening the last part of June. *Allium amophilum*,* is very similar to this, but has yellow-green foliage and blooms the first part of June.

Two fine lavenders are the varieties of *Allium tanguticum*, Avalon and Crown Lake. Their heads of small stars are ef-

fective through most of August. They are at their best when they have become well established.

Some do not like the white-flowered *Allium Stellerianum* because it seeds itself so easily; but it is so showy during August (when there is little else), and so good for cutting, that it is well worth the trouble of weeding out seedlings.

Tall Varieties

Allium tuberosum, a tall, lovely white variety that spreads slowly, blooms about the Fourth of July.

My favorite, *Allium pulchellum*, is very easy to grow from seed, and even sows itself. It sends up but a single stalk; yet as a result of close planting and seeding, it soon forms a dense patch well protected from trowel injury. It is tall, and a lovely violet-purple; I call it the rocket, thinking of the rocket-flowers that bloom in the night sky on the Fourth of July. It is an enduring plant, and a good one for the beginner with Alliums. It is a beauty to cut. The period of bloom is a full month in midsummer.

Another lovely tall one, *Allium caeruleum* (*azureum*), is more difficult to grow. It is a true blue with no lavender in it. Its single stalk does not show well, and so it is apt to be lost in weeding and digging. For safety it is best planted about fifty to a hundred in a compact group. I found it difficult to raise this from seed in a cold frame; and so I tried it again in the greenhouse of a friend. Seed was sown in April, the seedlings potted in July. These were left in an unheated greenhouse all winter, and put up on a bench in the sunlight at the end of February when they showed new growth. Planted out in ordinary soil in April, they were in bloom the first week in June, and bloomed until the end of August.

This long season of bloom is a great asset of the Alliums. Little known to most gardeners, they make excellent hobby plants, something to investigate, but not too difficult nor too expensive.

*Hortus II says that *Allium amophilum* has yellow flowers, but is often included with *Allium angulosum*, which has lavender flowers.—Ed.

HOW TO DIVIDE PEONY ROOTS

Technique and timing for best results

Edward Auten, Jr.

THE worst possible way to divide a Peony root is to take a spade in the spring, dig down alongside an old clump, and shave off a portion of it. This is wasteful of material, invites decay in the wounded clump, and besides, is the wrong time of the year. The "fiscal year" for a Peony begins not in the spring, but in late summer or early autumn; and that is the only time a clump should be dug and divided if best results are desired.

Growth Cycle of Peony Roots

A Peony plant is composed of an underground crown or fleshy mass from which roots extend downward and stalks upward. The stalks die every year; but soon after blooming time, on the underground crown, new eyes begin to form, which are the beginning of next year's stalks. Digging can be done as early as August 1 to 10, but it is better to wait until near the first of September. At

Cutting of stems and roots before digging the clump

that time, the new eyes will be little more than $\frac{1}{4}$ inch long, and the roots will be practically dormant. But by the first of December these new eyes are sometimes 2 inches long, the large roots have thrown out white hairy rootlets, and the whole root system is very brittle and much more easily damaged than a month or two earlier.

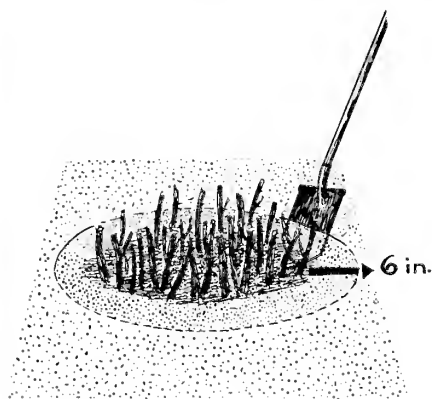
It is better to divide an old clump than to reset it entire. A reset clump usually deteriorates; while a good division makes a whole new structure underground, which should last for many years if conditions are right.

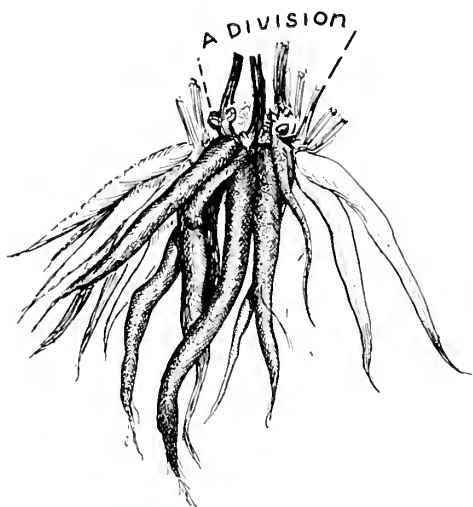
Method of Dividing

First cut off the foliage 6 inches above ground; tie a label (the name of the Peony) very securely to one of the stubs, so that it cannot slip off in handling. Cut the roots about 6 inches out from the circle of stems; be sure to cut entirely around the plant. Undercut as much as possible before prying the clump loose; then dig the whole clump. Wash off all soil, or shake it off if it is light. When using the hose, be careful not to damage the eyes with a strong stream of water.

The clump is now ready to be divided. Some prefer to let it stand a few hours first, to become a little less brittle; but this is not really necessary. The ideal instrument is a strong, sharp knife, with a 4-inch blade, about $\frac{3}{8}$ inch wide, and having a long, centered point—especially if it is of the old-fashioned carbon steel (which is much better than most of the stainless steel in knives now on the market).

With the common species (*Paeonia albiflora*) new roots and eyes must come from the crown; and so, in dividing, it is necessary to have eyes, crown, and roots in each division. A piece of crown alone will eventually make a new plant, but

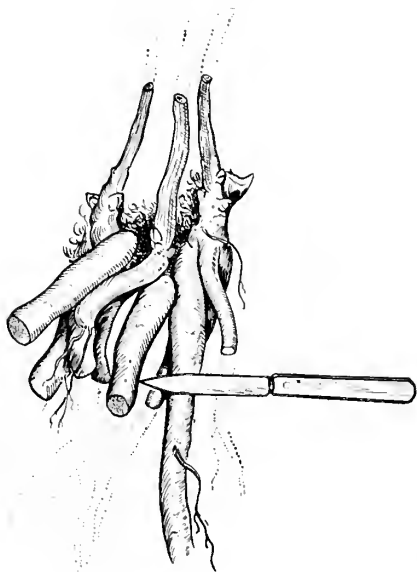




Clump of roots, indicating three divisions

very slowly. The standard division has from three to five eyes, with suitable crown, and one or more roots. A single root with only one eye will make a good plant, but it will take an extra year. If

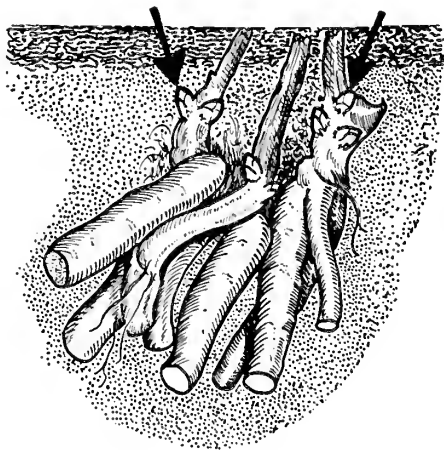
Middle division removed from clump; roots being cut back



you are seeking to get the most out of a clump, first take off whatever small divisions can be most easily made.

In general, a clump is cut pie-fashion; but as roots often intertwine, and certain roots seem to feed certain parts of the crown, there is need to study the structure carefully before cutting. An inexperienced person might get only two mediocre divisions from a clump, where an expert could get four better ones. Trim out all decay and cut the roots back to a length of 4 or 5 inches

A division planted



at the most. It is true that the first year bloom would be better if the roots were left longer; but the tendency then would be for the *old* roots to enlarge and thus slow up the plant. Short roots, on the other hand, tend to force development of *new* roots, and make a much better clump in the end.

Roots of *Paeonia officinalis* are somewhat similar to Dahlia root clumps, but are divided the same as those of *Paeonia albiflora*. A root broken off the crown will (if planted) eventually send out an eye and stalk from its side; but this method of propagation is slow. Many of the Peonies which come from Japan (of *Paeonia albiflora* origin) will

send out new eyes from the side of a root, just as will *Paeonia officinalis*. These are doubtless hybrids of some sort, though probably not hybrids between *Paeonia officinalis* and *Paeonia albiflora*.

Antiseptics

After dividing each clump it is well to clean the knife with an antiseptic, such as a solution of permanganate of potash. Just before replanting the roots—in new soil, if possible—soak them for 10 minutes in a formaldehyde solution such as is recommended for potatoes.¹ This bath is given for the

¹ One part in 240, or a pint in 30 gallons. An easy way to make a small amount is to

purpose of killing injurious fungi which may be on the roots. Do not try to save nematode-infested roots.² Excessive decay from blight or wet location is a handicap, but not fatal if cleaned out carefully.

In dividing Peony roots, meticulous care is well rewarded.

take a gallon of water, dip out and throw away a cupful, then add a tablespoonful of commercial formalin to what is left of the gallon of water.—Ed.

² Nematodes (minute worms) cause the formation of lumpy growths on the feeding roots of the Peonies. These lumps look like the nodules formed by bacteria on the roots of legumes; but unfortunately they are injurious to the plants, not beneficial as are the bacteria.—Ed.

The Bride, a variety of *Paeonia albiflora*

McFarland photo



CONTROL OF THE JAPANESE BEETLE

By means of the milky disease

C. H. Hadley

WHAT is the milky disease of Japanese beetle grubs? How does it work? How it is used? How does the milky disease compare in effectiveness with chemical insecticides such as DDT or lead arsenate? Will milky disease control adult Japanese beetles?—These questions are frequently asked by homeowners and others faced with the necessity for fighting the Japanese beetle and protecting their lawns or other turf areas from damage by Japanese beetle grubs.

The control of the Japanese beetle is in reality a dual problem which involves both the grub and the adult stages.



Grub stage of Japanese beetle, curled up in its winter cell in the ground (about twice natural size)

The first problem is the control of the young or grub stage in the soil. The grub is a particularly bad pest of lawns, since grass roots constitute its primary source of food. Milky disease spore dust is intended for use against this stage, to protect lawns or other turf areas from injury. The grubs are usually found in comparatively small numbers in cultivated soil, unless sod or turf has been turned under for garden purposes. Treatments of garden areas are, therefore, of less importance than treatments of lawns and other grass areas.

What is the milky disease?

Japanese beetle grubs are subject to a number of diseases caused by microscopic soil-inhabiting organisms, such as bacteria, fungi, nematodes, and protozoa.

The bacteria that cause the milky diseases of the Japanese beetle are the most effective of a number of these tiny disease-causing organisms that have been studied by the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture at its research laboratory at Moorestown, New Jersey. The milky diseases are caused by spore-forming bacteria known to scientists as *Bacillus Popilliae* and *Bacillus lentimorbus*. The former is the predominant species, and is the one referred to in this discussion.

How does milky disease work?

The milky disease bacteria normally occur in the soil as spores. As the Japanese beetle grubs work their way through the soil, feeding on grass roots and other vegetable matter, they ingest the spores of the organism along with the particles of soil and food material. After a grub has become infected in this manner, the bacteria multiply rapidly in its body, and soon cause its death. The billions of spores produced in the blood, which is normally clear, give it a milky appearance—hence the name “milky disease.” Under conditions favorable to its spread, this disease is fatal to a high percentage of the grubs.

The milky disease spores are remarkably resistant to dryness or excess moisture, and to high or low temperatures. They remain alive in the soil for long periods, ready to infect and kill successive generations of Japanese beetle grubs as the latter move about in the soil and feed. Milky disease spores remain alive even after they have passed through the digestive tracts of birds and small animals that have eaten diseased grubs. This is one of nature's methods of distributing the organism. Fortunately, the milky diseases do not attack human beings, warm-blooded animals, or plants.

How is milky disease used?

Bureau workers have developed a device for inoculating living Japanese beetle grubs with measured doses of the disease organisms, and a method of using inoculated grubs for the mass production of spores of the milky disease organism in the laboratory. Infected grubs are processed with talc to form a spore-dust mixture, which can be applied to turf and other grub-infested areas. Since the fall of 1939 nearly 144,000 pounds of spore dust have been produced at the Moorestown laboratory.

The Department of Agriculture does not have spore dust available for distribution to private individuals or organizations, but several concerns have been licensed by the Secretary of Agriculture to manufacture it for sale. Milky disease spore dust prepared under this license is standardized to contain 100 million spores per gram (approximately one half teaspoonful). The spore dust is available commercially with directions for its use, and may be applied by individuals or community groups.

A program for utilizing the milky disease organism in a practical way, to bring about a substantial reduction in the Japanese beetle population, is being carried on by the Department of Agriculture in cooperation with State agencies. This program has been in progress since the fall of 1939. Thus far more than 90,700 sites in thirteen eastern States and the District of Columbia have been treated. Marked reductions in beetle infestation have already resulted in many of the treated areas, owing largely to the rapid development of the disease where conditions have been favorable. In some localities, climatic or other conditions have not been entirely favorable for rapid establishment and development of the disease.

There are various ways by which the spore dust may be applied to infested turf. In the spot-treatment method, 2 grams of the material (approximately 1 level tea-



U.S.D.A. photos (Entomology and Plant Quarantine)

Spot-treating beetle-infested turf by means of corn planter

spoonful) are usually applied at intervals of 3 feet (at 3-foot intervals in rows 3 feet apart), 5 feet, or 10 feet, depending upon the degree of infestation. Usually less time is required for the disease to become effective when the lowest spacing is used. An ordinary hand-operated corn planter with a rotary disc seeder is a cheap and convenient tool for spot-treating areas of an acre or more. The planter



Corn planter suitable for applying spore dust to turf



Spreading spore dust with garden-type fertilizer distributor

can be adjusted to deliver about a teaspoonful each time it is tripped. For smaller areas, such as an ordinary lawn, a teaspoon can be used to distribute the spore dust. When the spore dust is applied with a corn planter and placed at intervals of 3 feet, about 20 pounds will be required to treat one acre; 5-foot intervals will require about $7\frac{1}{2}$ pounds, and 10-foot intervals about $1\frac{3}{4}$ pounds.

The spore dust may also be broadcast over the turf by hand, or spread with a garden-type fertilizer distributor—not less than 10 pounds per acre. The required amount of spore dust should be thoroughly mixed with several times its volume of topsoil, fairly coarse sand, or commercial fertilizer.

One treatment of infested turf with spore dust is usually sufficient to insure establishment. When the organism of the milky disease becomes thoroughly established in the soil, the grub population in that area will be greatly reduced. The period required for thorough establishment of the milky disease in any area depends on many factors, including the amount of spore dust applied and the grub population in the treated area. Several seasons may be required before treatments become fully effective. The first noticeable effect will be a reduction in the grub population and less turf injury in the areas where the spore dust has been

applied. The disease will gradually spread to adjoining areas.

How does milky disease compare with chemical insecticides?

Where a quick kill of the grubs is necessary to prevent damage to the turf, the use of the milky disease is not advised in preference to the application of chemical insecticides. Where there is a heavy grub population, and damage to the turf is occurring or is likely to occur in the near future, the milky disease does not act quickly enough (at the dosages usually advised) to stop or prevent the injury. Under such conditions an application of one of the chemical insecticides, such as DDT or lead arsenate, will be more effective in a much shorter time.

Will milky disease control adult Japanese beetles?

The second problem presented by the Japanese beetle is the control of the adult beetle, which feeds upon a wide variety of plants, including certain fruits, ornamentals, and vegetables. The milky disease is not a direct remedy for the adult beetle, although it will reduce the numbers of beetles that originate in treated areas if it has become well established. Because of their active flight habits, many beetles that develop elsewhere may invade an area where the disease is established. Elimination of grubs from turf areas does not necessarily mean, therefore, that adult beetles will not injure vegetation in or surrounding the treated area, especially if this is of small size.

General information on the Japanese beetle and the various control measures that have been developed by the United States Department of Agriculture is given in Department publications, which are available upon request.

Adult Japanese beetle, slightly enlarged



WITHIN THE BROOKLYN BOTANIC GARDEN

TWENTY-FIRST ROSE GARDEN DAY

The Rose Garden has come of age. Its twenty-first birthday was celebrated on June 8, beneath a warm sun, and with some three hundred members of the Garden and their guests in attendance. Mr. S. R. Tilley, Rose Gardener "Emeritus," and Mr. Donald Colyer, his suc-

cessor, led the inspection tour of the Garden. Following the tour, members of the Auxiliary served tea in the Rotunda of the Laboratory Building. The Rose Garden was made possible through the generosity of the late Mr. Walter V. Cranford, and Mrs. Cranford.

Mrs. Walter V. Cranford, with her daughter (right) and grandniece (left), in the Rose Garden with the Director of the Botanic Garden

Brooklyn Eagle photo



Herbs again

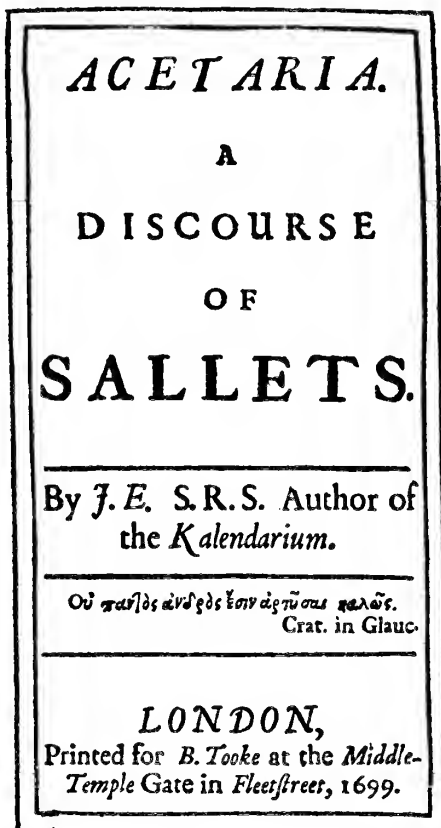
John Evelyn's —→

A faithful reprint of the First Edition of 1699

SINCE the appearance of Anne Webb's "Herbs for the Home Garden" in the summer issue of *PLANTS & GARDENS*, renewed interest has been aroused in the culinary use of herbs. One hundred fifty years ago a similar interest prompted John Evelyn to write his delightful classic, *ACETARIA*, on herbs used in the kitchen. This book is at once scholarly and amusing.

The herbs discussed by Evelyn, a contemporary of Samuel Pepys, are the same as those that grow in the amateur herb garden of today. But as his "Discourse" unfolds, they take on a fascination that impels the reader to try immediately a salad or pudding prepared according to Evelyn's instructions.

ACETARIA was made available to the public a few years ago, when a limited edition was printed by the Auxiliary of the Brooklyn Botanic Garden. A few copies are still available at \$3.15 (which includes postage and packing). Orders may be addressed to the Brooklyn Botanic Garden, Brooklyn 25, New York.



Facsimile of Title Page of First Edition

The Bindweed on this Barberry was killed by 2-4-D spray



BINDWEED KILLING

The Bindweeds—Wild Morning-glory (*Convolvulus sepium* and *Convolvulus arvensis*) and Wild Buckwheat (*Polygonum Convolvulus*)—are among our worst weed pests. A campaign is being waged by the Garden to eradicate them. 2-4-D, sprayed on the vines, kills them, roots and all. In hand weeding, the roots remain alive, and send up new growth.

Extreme care must be taken, in applying 2-4-D, to prevent the spray from reaching desirable plants near by.

BROOKLYN BOTANIC GARDEN
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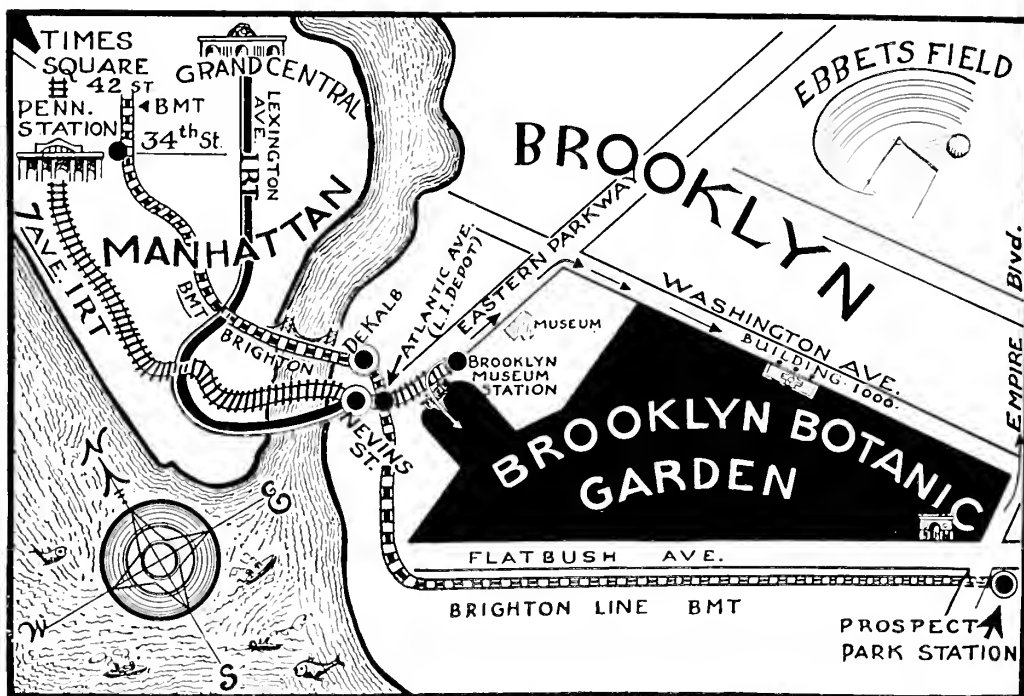
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TO VISITORS

To reach the Garden:

By SUBWAY: from Manhattan, twenty-five to thirty minutes' ride from Times Square or Grand Central.

I.R.T., West Side (7th Avenue or Broadway-7th Avenue line), downtown express marked "New Lots Avenue" or "Flatbush Avenue," to Eastern Parkway-Brooklyn Museum Station.

I.R.T., East Side (Lexington Avenue line), downtown express marked "New Lots Avenue" or "Utica Avenue" or "Atlantic Avenue," to Nevins Street, step across platform and change to 7th Avenue or Broadway-7th Avenue train, ride to Eastern Parkway-Brooklyn Museum Station.

B.M.T., Brighton Beach line, downtown express or local to Prospect Park Station.

By AUTOMOBILE.

From Long Island, take Eastern Parkway westward, and turn left at Washington Avenue.

From Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway; follow the Parkway to Washington Avenue, then turn right.

PL
GAR

Winter, 1948

The Year's Highlights
in
Horticulture and Gardening

The Redwood of China

Guide to
Recent Non-technical
Books and Articles
about Plants



AUTHORS WHOSE ARTICLES APPEAR IN THIS ISSUE

- W. C. BAKER, landscape painter, and Professor Emeritus of Drawing, Cornell University, Ithaca, New York.
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- C. O. MORRIS, pen-name of Claude H. Miller of Cheshire, Connecticut, formerly managing editor of *Country Life in America*, and owner-editor of several weekly newspapers; author of several books and many articles.
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Euonymus Fortunei var. *vegetus*

NEW SERIES

Winter, 1948

VOL. 4—No. 4

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JOHN C. WISTER, *Editor*

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Winter comes to the Garden

Except where otherwise credited, photographs by Louis Buhle

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Winter 1948

ABOUT THIS ISSUE:

This is the fourth time that our Editorial Committee has selected a group of the year's outstanding articles from the gardening and horticultural magazines - for condensation or reprinting in *PLANTS & GARDENS*. It is not easy to choose a dozen or so articles when there is so much good material to select from.

The Brooklyn Botanic Garden takes this occasion to honor the authors of this year's selected articles. It wishes similarly to honor the journals in which the articles were originally published. Editors and publishers have cooperated generously in making it possible to assemble the chosen material here.

One of the great biological dramas of our time is reported in this issue. What a sensation it would be if dinosaurs or Neanderthal man were found living in some secluded valley in a little-known part of the world! We have long been acquainted with fossils of these pre-historic creatures; to find them alive would be almost unbelievable. Yet this very thing has happened in the plant world. Several years ago fossils were discovered of a tree obviously related to the great Sequoias of California. The fossil tree was named "Metasequoia," and thought to be extinct. Three or four years after the discovery of the fossil came the report that a small stand of living Metasequoias still exists in China. Dr. Ralph W. Chaney gives an authoritative account of this discovery (p.231) and points out that a nearly extinct species is on its way back.

For three years Editor Wister has given careful guidance to the pages of *PLANTS & GARDENS*. With this number he leaves us to give closer attention to his many other horticultural interests and commitments. It has been a privilege to have him associated with us, and we shall miss him. Our readers will miss him also. His rich experience and fine knowledge of ornamental plants have been of inestimable worth in maintaining a high horticultural standard for P. & G.

Guest Editor of the spring 1949 issue will be Conrad B. Link (Rhododendrons and Azaleas); of the summer 1949 issue, George L. Slate (Lilies). Dwarf shrubs and trees will be the feature of the autumn issue.

The 1947-48 Annual Report of the Garden is available for the asking.

The Season's Greetings

George L. Curry, Jr.

Director

CONSERVATION AND GARDENERS

A call to arms

John C. Wister

Condensed from *Horticulture*, March, 1948,
with pictures added

GARDENERS have a special understanding of the problems of conservation of soil, wild plants, forest trees, and beautiful scenery, because they practice conservation on their own home grounds. They terrace their gardens to prevent excessive erosion. With manure, peat-moss, and leaf mold they add humus to their soil. By weeding they give opportunities for their best plants to flourish without undue competition. Because they plant and prune their shrubs and trees, and take out those that have become overcrowded or diseased, they notice (more than other people do) the condition of city, state, and national parks.

For this reason gardeners have, for generations, been in the forefront in the battle to conserve our natural resources. Professor C. S. Sargent of the Arnold Arboretum, Frederick Law Olmsted, and Dr. J. Horace McFarland are but three examples of gardeners whose influence became nation-wide. Organized garden clubs have been the greatest champions of fine parks. The purchase of a memorial grove of Redwoods in California by the Garden Club of America is an example of this.

Present Need

It is, therefore, natural that the great horticultural societies of the country should join the National Parks Association, the American Planning and Civic Association, The Wilderness Society, the mountain clubs, and other groups of patriotic citizens in opposing the present ef-

Published at Horticultural Hall, by the Massachusetts Horticultural Society,
Boston 15, Mass.

Scene in Allegany State Park

Norman Taylor photo



forts of mining, water power, lumber, cattle, and other interests which are trying to encroach upon our great national parks in many parts of the West. In the present Congress various bills have been presented to take a little piece of land from this park or a larger piece from that park. The Olympic National Park, Glacier Park, and the Jackson Hole National Monument are only three which are now under fire. The present attacks are particularly dangerous, for it is a time when there is need of increased production of food, lumber, minerals, and water power.

Only in our great parks can our natural scenery be protected against commercial use. Logging, mining, and water power projects destroy trees which cannot be replaced for centuries, if at all; they destroy the undergrowth of flowering or fruiting shrubs, many of which produce berries or foliage which are the food for our birds and wild life; and they destroy the wild flowers which hold the soil against erosion and allow the formation of humus. Road building, swamp draining, and farming have necessarily destroyed a large percentage of our wild flowers, and have often even endangered the survival of a species. Any encroachment upon our parks means more destruction and means the whittling



U. S. Forest Service photo

Destructive lumbering—the aftermath

down of the only areas where these sometimes rare specimens can be preserved for the pleasure of future generations.

We owe the parks, of which we are so proud, to the valiant and voluntary efforts of those who have gone before us. Most people assume that, because national parks have been reserved by Congress, they are therefore safe forever. These people are not aware that the parks are subject to legislative and other attacks by vested interests. It is the responsibility of every citizen to become familiar with these problems and to take positive action to prevent park despoliation. The success of the conservation movement can be ensured only if the citizens, as individuals, and as members of organizations large and small—and particularly the gardeners' press—will throw their full weight into this fight to prevent the destruction of much of our national heritage.

NATURE

We need to be reminded once in a while . . . that, in addition to our troubled social world, we live just as truly and as inescapably, in a natural world of rocks and herbs and trees, of birds and animals. The maintenance of a normal mental outlook on life is difficult, and we must leave our business at intervals for the stimuli of other lines of thought. Essays, histories, poetry, music, all contribute to

enlargement of horizon and stability of our life philosophy. But in these there are still lacking certain mental stimuli. . . . We must at times renew our physical and mental contact with nature, with growing things in gardens or on walks in woods, amid which man has lived for a million years. "The groves were God's first temples."

HERVEY WOODBURN SHIMER

Paragraph from the introduction to *The Geology of Rocky Woods Reservation*, published by the Trustees of Public Reservations, 50 Congress Street, Boston, Mass.

NOT FACTS ALONE

But appreciation of beauty

W. C. Baker

Condensed from *The Cornell Plantations*,
Spring, 1948

WE live in a beautiful world. Fortunate are those whose homes are in or near Ithaca, New York; for here, where her beauty is unsurpassed, Nature has provided a suitable setting for a great institute of learning. Like most students, I was not fully aware of my good fortune, not only in the opportunity to study under such leaders, but to be able to do so in such an environment. There must have been a spark of appreciation in me, however, for I was one of the organizers of "The Tree Club" which made excursions

to various parts of the region to study our native trees.

But our study of trees was incomplete; we failed to gain something that is just as interesting and certainly of more lasting value than facts alone, and that is appreciation of the beauty of our trees. We lacked guidance in this direction, as have, I believe, most nature study classes since. Had our group been able to have someone, both artist and naturalist, to point out the natural beauty all about us, to call our attention to the rhythm, the tone of light, and shade and shadow, how infinitely more rewarding would our outings have been. I am convinced that in the appreciation of beauty, nurture can supplement nature; indeed I have proved it to my own satisfaction.

Mountain and valley in the Finger Lakes region. From a painting by the author



Perhaps the average person may be like the Irish peasant woman whose response to the American traveler's enthusiasm over Killarney scenery was: "I enjoys, I don't jabber." Among the many biologists that I have met, only a few ever manifested interest in an appreciation of the beauty of the materials in their respective fields. Where I was stirred by color-harmony and variety and design, they seemed to notice only identification or classification characters. This indifference to the cultivation of our sense of

beauty, the experience of which is so deeply and lastingly satisfying, is manifest not only in natural science studies, but in our whole educational scheme.

Unfortunately our civilization is dominated by business, which also greatly influences our educational methods. But education should be for "living" as well as for "making a living." So long as the study of beauty is generally considered of no practical, that is, dollar value, so long shall we continue our slow progress toward the "good life."

Published by Cornell University at Ithaca, N. Y.

THE BEST OF THE MOCK-ORANGES

Sweetest scented of June's flowering shrubs

P. J. Van Melle

Condensed from *The Home Garden*,
June, 1948

THESE shrubs (*Philadelphus*) derive their common name, Mock-orange, from a resemblance of the buds of the old, sweet-scented *Philadelphus coronarius* to those of Orange blossoms, for which they have been used as substitutes in bridal bouquets. It is a better popular name than "Syringa," which, properly, is the botanical name for Lilacs.

No matter how exquisite their flowers, the Mock-oranges possess none of those varied attractions for which many other shrubs are valued throughout the year. Most of them are rather undistinguished-looking shrubs. Many grow inordinately large or become leggy or sparsely leaved;

some are of acceptable habit, and very few of them possess any degree of daintiness. In selecting Mock-oranges for the small home landscape, the logical thing to do is to go for the best of the floral offerings available in the dwarf kinds.

Most of the Mock-oranges flower in June. A few come at the end of May, and some as late as July. All bear their flowers terminally or on lateral branchlets newly sprouted from last year's wood. In a few kinds the flowers are borne solitarily—in most they are clustered.

A maximum production of flowers may be insured by the annual reduction of all the main stalks as soon as the flower show is over. This will encourage the development of the new shoots which are then usually already sprouting from near the base of the bush, and induce additional growths from the reduced branches. Hard pruning, too, will enable one to keep down some of the large-growing kinds to small proportions, and to prevent the tendency toward legginess in some kinds.

For best results, plant the Mock-oranges in open, full-sun situations, in not too heavy soils of fair nutritive quality. They will thrive well enough in the filtered sunlight of light overhead shade, but not in the solid shade of buildings. All are easily transplanted, bare-rooted, in spring or autumn.

Species and Varieties

For the small home landscape in, say, the mid-Hudson country—that is, some distance north and inland of New York City, I would include the old, sweet-scented *Philadelphus coronarius*, even though its normal proportions exceed the accommodations of most borders. It makes a dense, broadly rounded bush, 7 to 8 feet high or more, usually wider than high, and bears an abundance of creamy white, single flowers about 1 inch wide, of an exquisite, strong fragrance. Where space permits, this species will, even without pruning, form a bush of acceptable form and of rare floral charm. But it may easily, with hard pruning, be kept down to much smaller proportions. Unfortunately, though it is listed by name in

Flowers of *Philadelphus coronarius*

McFarland photo



McFarland photo

Philadelphus pekinensis

many catalogs, the purchaser will, in many instances, receive under its name, a much coarser-leaved, more erect shrub, with larger, pure white, scentless flowers, which is either *Philadelphus grandiflorus* or close to it. Some nurseries have the true kind—others not.

There is a double-flowered form of this species, listed as variety *flore-pleno* or *duplex*; and also a golden-leaved form, *aureus*, which furnishes a bright color note in the border, especially in early summer.

Not very hardy, and suggested here only for occasional use in favored places, but definitely worth experimenting with, is *Philadelphus microphyllus*, a southwestern United States species, of neat, rather upright habit, daintily small-leaved, and bearing white flowers of a strong, but highly distinctive fragrance, into July.

Worth planting, if you can locate it in any of the nurseries, is the hardy north-Chinese and Korean *Philadelphus pekinensis*, a broad, roundish shrub to about 6 feet high, with mildly fragrant, creamy white flowers, not large, but well clustered. And there is a more erect-growing variety of it, *brachybotrys*.

Hybrids

It is among the hybrids that we find the best of the garden Mock-oranges. The **Lemoine Hybrids**, crosses between *Philadelphus coronarius* and *Philadelphus microphyllus*, have never been equaled by any other hybrid group for a combination of floral, foliage, and habit qualities and moderate proportions.

The type of this group is *Philadelphus Lemoinei*, a broadly rounded bush to about 6 feet, with mildly fragrant, pure white flowers to 1¾ inches wide, borne in heavy bouquets.

The hybrids of this group run mostly between 4 and 6 feet in height, and include, among others, the following named kinds:

- Avalanche—*single, pure white*
- Boule d'Argent—*double white, slightly fragrant*
- Candelabre—*single white*
- Dame Blanche—*creamy white, petals fringed; fully 6 feet high*
- Erectus—*single white, small-leaved, of erect habit*
- Manteau d'Hermine—*creamy white, semi-double; habit low and broad*
- Mont Blanc—*large, single white flowers*

While the following hybrid groups contain many floral effects superior to those in the Lemoine group, most of them make larger, coarser, and often leggy shrubs which, when not in bloom, are scarcely to be considered assets in the shrub border. I have known people to plant them as a hedgerow along the vegetable garden, simply for the production of flowers, not as ornamental shrubs.

By crossing Lemoine Hybrids with the large-flowered, scentless *Philadelphus grandiflorus* were obtained the **Cymosus Hybrids**, of greatly varying heights, and with single, semi-double, or fully double, mostly slightly fragrant flowers. Among these are the following:

- Banniere—*semi-double; 7 to 8 feet high*
- Conquete—*double, somewhat early; 4 to 5 feet*



McFarland photo

Philadelphus Candelabre, a Lemoine hybrid

- Mer de Glace—*double; to 6 feet*
- Norma—*single or double, petals fringed; 8 to 9 feet*
- Nuee Blanche—*single; 4 to 5 feet*
- Voie Lactee—*creamy white; 6 to 7 feet*

Crosses of Lemoine Hybrids with the tall, late-flowering hybrid, *Philadelphus insignis* (with faintly scented flowers), produced the **Polyanthus Hybrids**, mostly of tall, erect habit, including:

- Favorite—*about 6 feet; rather leggy*
- Gerbe de Neige—*single, white; about 6 feet*
- Pavillon Blanc—*very sweetly scented; to 8 feet*

Lemoine Hybrids, crossed with *Philadelphus nivalis plenus* (a hybrid itself, of the tall, late-flowered *Philadelphus pubescens*), gave rise to the now popular **Virginalis Hybrids**, mostly erect, often leggy shrubs upward of 6 feet high, with single, semi-double, or quite double,

Philadelphus Norma, a Cymosus hybrid

McFarland photo



mostly finely scented flowers, often produced more or less protractedly through the summer. Not all of this group are perfectly hardy in the mid-Hudson Valley, but they are, in the main, hardy enough for use in not too exposed places. Among these are:

Albatre—*semi-double, smallish flowers; about 6 feet*

Argentine—*double; about 5 feet*

Glacier—*small, double flowers; to about 6 feet*

Minnesota Snowflake—*a recently patented hybrid; double, very fragrant; blooms into July; 7 to 8 feet*

Virginal—*semi-double, large-flowered, finely fragrant; often continues to flower through the summer; to 8 feet, of very leggy habit*

A comparatively tender group of hybrids—not reliably hardy in the mid-Hudson country—are the **Purpleo-**

maculatus Hybrids, derived from crossing Lemoine Hybrids with the tender, far-southern United States species, *Philadelphus Coulteri*, in which the flowers are blotched purplish red at the base of the petals, creating the effect of a reddish throat. In this group belong:

Etoile Rose—*about 6 feet*

Fantaisie—*flowers not blotched, but with rose-tinted center*

Oeil de Pourpre—*with very dark center*

Romeo—*creamy white with purple center*

Sybille—*white, pink spotted toward the center; petals fringed; 5 to 6 feet*

These Purpleo-maculatus Hybrids, with their dark-throated or tinted flowers introduce so highly distinct a note among the Mock-oranges and are, generally, of so much better habit than some of the other groups, that they may well deserve at least experimental use in our colder climates.



KNOW YOUR NURSERYMAN

"Buy only from established agents, or nurseries which can prove their reliability," says George M. Husser, in "Bogus Shrub Peddlers and Tree Doctors," in *American Nurseryman*, May 1, 1948.

Numerous frauds have recently been discovered: various mail order frauds; truckmen selling worthless or even harmful "humus"; incompetent "tree surgeons" who ruin trees; "termite men" who "find" pests and diseases that do not exist, and collect fees for "treating" them; unauthorized "representatives" of reputable firms; and peddlers with misrepresented

stock, such as balled-and-burlapped trees with no roots, bulbs that will not grow, sod cut too thin, grass seed that is largely chaff, and grass seed *supposed* to produce grass that will grow to the desired height, then stop growing but remain green throughout the season and require no mowing!

Do not pay cash deposits in advance to unknown solicitors. Take the automobile license number of any of these cruising salesmen, and send it to the Better Business Bureau.

LANDSCAPING

Starting from scratch

Francis C. Wilson

Condensed from *Gardeners' Chronicle of America*, August, 1948, with pictures added

WHERE a swamp once lay, rows of houses now run, each house standing naked on earth churned deep and rough-leveled by the bulldozer. Here is an area typical of many throughout the country, an area now ready to be landscaped. If the owner of one of these tiny lots should ask me how to build a garden up from scratch, how would I advise him?

Soil Preparation

The soil must be provided with a store of plant food and brought into good physical condition before any permanent plantings can be made. Both conditions are brought about by deep working; by the removal of large stones near the surface; and by incorporation into the soil of liberal dressings of decomposed manure, or of peat-moss together with a complete fertilizer such as 4-12-4 applied at the rate of 4 pounds to each 100 square feet. Stiff clays (common because of subsoil excavation) require deep working over a longer period. I would leave such a soil rough for the first winter, in order that frost should penetrate deeply, break up the hard lumps of clay, and make the ground more readily workable. Then in the spring I would dig the ground and add lime and manure. The back part of the lot I would run as a kitchen garden for a season, setting the vegetable rows wide apart (at least two feet) and cultivating at every suitable opportunity, that is, when the soil was moist enough to work easily but not wet enough to paste. In fall when the ground

was cleared I would dig once more, adding more manure. It should then be possible to rake the soil down to a fine tilth in which to sow grass seed which would germinate readily at that time to make a fine lawn for the following year.

Lawn

A fine lawn is secured by deep and thorough preparation of the soil; this includes a built-in reserve of humus—a long-lasting water-holding sponge which will carry the lawn through summer drought. In addition the lawn should be dressed both spring and fall with a fertilizer high in nitrogen, applied at the rate of 2 to 3 pounds per 100 square feet. A sodded lawn produces a quick result, and is most practicable where the area is in frequent use. A seeded lawn usually produces a finer sward, and is established at much less cost. In partially shaded areas a *shade* grass seed such as *Poa trivialis* may be sown to produce good results; but in densely shaded areas the best ground cover is probably Japanese Spurge (*Pachysandra terminalis*). In between areas use Lily-of-the-valley.

A low hedge of *Spiraea* Anthony Waterer





The native Meadowsweet (*Spiraea latifolia*)

Enclosure

If any real gardening is to be done on the city lot, it is almost always necessary to enclose the area. Enclosure at the front of the lot, if any, is usually confined to the sides, where a low hedge of *Berberis*, *Spiraea*, Snowberry, *Ribes alpina*, or other low material may be planted and allowed to grow in a natural manner. At the back of the lot full enclosure may be secured by a fence or hedge. A hedge on a small lot tends to overpower the enclosed elements of the composition. Its roots rob the soil of plant food and water needed by other plants; and in certain situations it may cast shade which will prohibit the growth of other plants such as Hollyhock and Delphinium, thus creating gaps in the perennial border which cannot be filled adequately by shade plants.

The picket fence has much to recommend it as a suitable method of enclosing the small lot. The fence can be broken up by plantings of flowering shrubs, using taller material such as Lilacs or *Philadelphus* near the house for the sake of privacy; dropping down towards the

center of the lot with lower-growing shrubs such as Hydrangea, *Spiraea*, or Grootendorst Roses; raising height again and billowing the shrub plantings out at the lower corners of the lot, to provide strength at an otherwise weak point and to provide a bay in which the perennial border may nestle as a subordinate but interesting part of the composition.

Trees

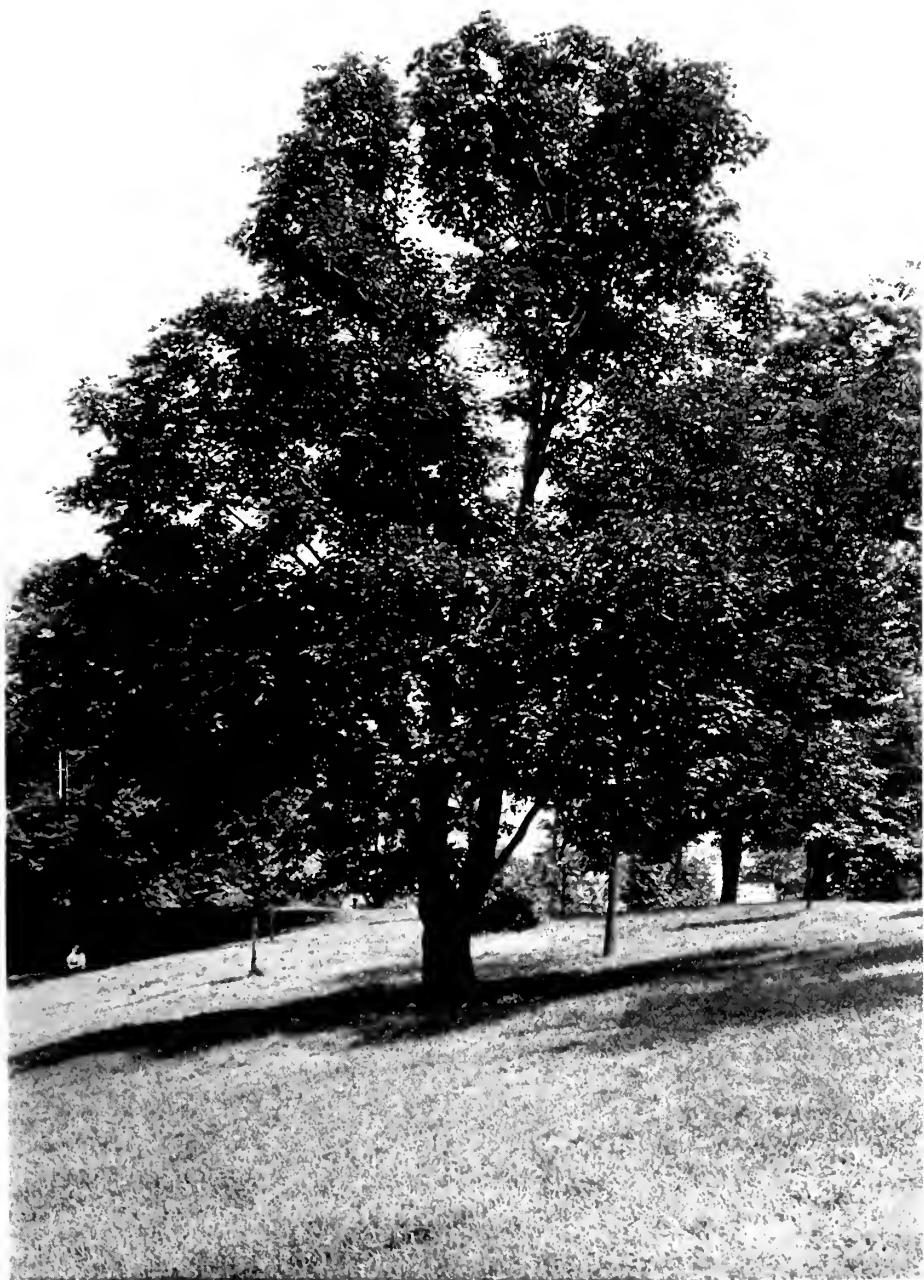
Even on the small lot there is generally room for one or two trees. One large tree near the house side will provide welcome shade and act as a frame for the house. For this purpose there is nothing better than one or other of the species of Maple. Elsewhere smaller trees such as Mountain-ash or Crab Apple can be used, near the house or the sides of the lot, or in the central position at the bottom of the garden.

Foundation Planting

The essentials of foundation planting around the house are: (1) the doorways should be framed with suitable shrubs or evergreens; (2) the house corners should be softened by careful planting; (3) plantings under windows should be of dwarf material which will not outgrow its position; (4) some part of the foundation should be left exposed to lend the appearance of strength, and to avoid a continuous planting which would cut the house off from its surroundings.

Time

Although most homeowners are interested in a landscaped lot, not all are prepared to spend much time in gardening. For the fisherman or the man with a summer cottage the best garden is one made up largely of lawn, flowering shrubs and small trees, and perennials such as Peonies, Iris, Day-lilies, Gas-plant, and Michaelmas Daisies. For the most part it is better to keep the layout of the small lot simple, and economical of time and labor; better a simple layout kept clean and neat than an elaborate one neglected.



Sycamore Maple (*Acer Pseudo-Platanus*) affords generous shade for the house

LET'S LOOK AT YOUR LAWN

To see what ails it and what can be done for it

John Melady

Condensed from *Gardeners' Chronicle of America*, August, 1948

A LIFETIME in the seed business has provided me with opportunities to examine thousands of lawns; sometimes to look at a good one, but more often to outline a routine for the improvement of a poor one.

Mowing

Many lawns are sick merely because they are not mown often enough. Cut your grass "long" or "short" as you wish, but please *mow it twice a week*, and raise the adjustment if wet weather makes you

postpone mowing. When you can resume twice-a-week cutting, lower the machine, a fraction of an inch each time, until the mower is back at its normal height. Then your clippings will always be so small that you could barely rake them if you tried. Cutting long grass short injures the lawn by exposing the undergrass suddenly to the sun's rays. Forget the clippings and let them shrivel to become part of the soil. If you employ a gardener, let him use your mower instead of his, so that the length of cut is always the same.

Soil

Growing a lawn on subsoil instead of topsoil, and general malnutrition are other causes of sick lawns. Spread 50 pounds of pulverized limestone over each 1,000

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A well-kept lawn

Eva Luoma photo



square feet every March, and 20 pounds of a good 5-10-5 fertilizer every May and September. Every lawn should receive at least one top-dressing of soil each year, as much as possible, provided the turf still shows green when the soil is rubbed in with the back of a rake. Materials should be spread only when the grass is dry, but sprinkling will help afterward.

Top-dressing with soil maintains an even surface under the grass, resulting in more accurate mowing. When topsoil is spread you may add to it humus, peat-moss, or rotted manure, if the soil lacks organic matter; coarse washed sand or screened coke ashes, if it needs grit; allow three spades of soil to one of the organic substances or grit; three parts to two if you add both.

Soil, and some fertilizers, are charged with introducing weeds, and it is true that all good soil does contain the seeds of wild plants, tall types, usually, that do not live under cutting—Ragweed, Golden-rod, Aster; and the weeds which may appear after spreading fertilizer usually grow from seeds already in the soil which have been induced to sprout by the increased fertility of the land.

But without the help of soil and fertilizers, weeds will show up, and their removal is part of the price we pay for good turf. Hand weed a 2,500-square-foot lawn, digging out the roots of Dandelions and Plantains; but the fibrous-rooted *Crab Grass* need only be cut at the surface. Fill or dress all holes and bare spots with five handfuls of soil mixed with one of grass seed. The dead end-of-winter circles of snow-mould, the mildew rings of brown-patch or dollar-spot, summer scald, or insect injury should be scratched with a rake and similarly dressed with soil and seed. For lawns over 2,500 square feet, there is economy in using a selective weed killer, like 2-4-D for Plantains and Dandelions, or a phenol-mercury preparation for Crab Grass; follow directions on the container exactly, and always complete the job with a fertilizer application.

Diseases and Pests

Diseases should first be checked with a fungicide. Grubs should be treated with arsenate of lead or DDT; or the lawn may be infected with spores of the milky disease, an epidemic fatal to Japanese beetle but harmless to anything else. Chlordane is a new and efficient insecticide for this pest, and it works well also on the clusters of hard-to-see chinch-bugs which sometimes turn the grass red-brown in hot weather and kill it by sucking the plant juices.

Renovating and Remaking

Like any other living thing, a lawn will eventually show signs of senility. With routine feeding this can be postponed for a long time; but eventually, sometimes in fifteen, thirty, or forty years, the lawn needs spading or ploughing and remaking. This may be postponed further by "renovating," which means spreading fertilizer, scratching the surface with a sharpened rake or punching holes in it with a spading fork, top-dressing with soil, and sowing seed. For making *new* lawns, September is the most favorable month, because few weeds grow along with the new grass at that season; but *weeds will often choke out a spring-made lawn*. Quantity of seed when mixtures are used is usually 5 pounds per 1,000 square feet. *Renovating* may be carried out at any time, however; and one of the most favorable seasons for broadcasting seed is during winter, without attempting to cover it, even on the snow in level areas.

Sifting soil on new seed does not work well; it is best to rake very lightly, or brush with tree branches or a broom. New seed has to be watered very carefully, if at all, because the soil covering easily washes off.

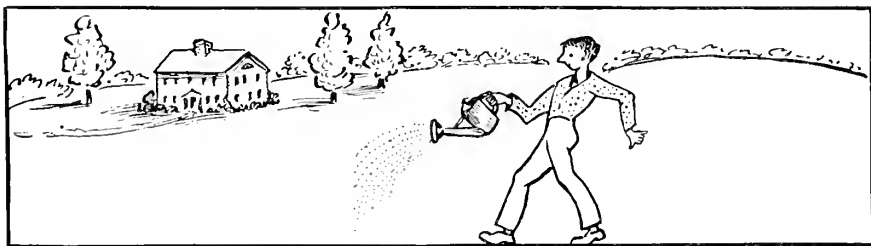
Kinds of Grass

In the latitude of New York we have three grass groups for lawns, the narrow flat-leaved **Bents**, thriving in summer and

needing moist, rich soil; the broader-leaved **Blue Grasses**, which grow in cooler weather but disappear in summer, and likewise need moist, rich land; and the wire-leaved **Fescues**, growing on poorer soil and "resenting" spring watering. A mixture of all three is advised. They all start slowly, and temporary "nurse" grasses are customarily sown with them; these may be Redtop, Rye Grass, or Meadow Fescue. The Alta strain of Tall Fescue is another nurse, helpful in difficult situations, like lawns

in smoky cities or on worn-out soil. Taller than the permanent grasses, the nurses cannot survive close cutting, and so they gradually disappear with mowing. Five per cent by weight in a seed mixture for house lawns may well consist of White Dutch or Wild White Clover.

A near-perfect lawn is a beautiful thing; and when you find one, you know that the soil on which it grows is *rich, porous, yet retentive of moisture*; and that the exquisite turf is the result of care and hard work.



WATERING THE HOME LAWN

So as to do good rather than harm

Robert W. Schery

Condensed from *Missouri Botanical Garden Bulletin*, June, 1948, with drawing added

HOW is it that a great many people water the lawn with the best of intentions, but do it little good, and sometimes even harm it? They have never thoughtfully considered the objectives of watering nor analyzed it in conjunction with the fundamental processes of lawn maintenance. Let us correlate watering procedure with type of soil, seasons of the year, and components of the lawn.

Adapt Watering to the Soil

At one extreme, soils may be porous or absorptive; and at the other extreme, impervious or scarcely absorptive. A great many factors control the porosity and absorptiveness of the soil. Of special importance are content of organic matter, and soil particle type and size. If the soil is high in organic matter (humus: the remains of decayed vegetation or manure) and/or has a "crumbly" feel, it will very likely absorb water quickly and well. When abundant organic matter is present the soil acts as a sponge, absorbing water and holding it. If, on the other hand, the soil contains little organic matter (generally indicated by light

color) and possesses a high percentage of clay particles which "puddle" as soon as wet, and give a "pasty" feel, getting water to penetrate into it becomes extremely difficult, especially on sloping ground.

The desired objective in watering the lawn is to allow the water to penetrate to all grass roots, i.e., to a depth of several inches in the topsoil. In lawns, where surface soil cannot be cultivated as can flower or shrub beds, penetration of water may be difficult, except in the more absorptive soils. On many soils, only prolonged and gradual application of water will give adequate penetration. Sloping lawns, under heavy application of (unabsorbed) water, have much run-off, which carries with it at least a little of the valuable topsoil. Usually, instead of sudden, heavy watering, we should sprinkle it with a fine spray, or with a canvas "seepage" hose, allowing smaller quantities of water to reach the soil surfaces over a considerable length of time. A fine spray, applied in one place for about two hours, then moved elsewhere, and reapplied a few hours later to the original area for a second two-hour soaking, will generally wet the topsoil to a depth of several inches. If, during the spraying, there is any significant run-off from lawn to gutter or sewer, water is being applied more rapidly than desirable.

Adapt Watering to the Season

Established lawns will normally not need any watering except in July and August (and perhaps part of September). These are the months of high temperatures and rapid and excessive moisture evaporation, and any watering that will insure moisture penetration into the soil and minimum evaporation to the air will be of benefit to the lawn. A lawn cannot be mulched to conserve water as can a shrubby bed, but water should be applied efficiently. Avoid sprinkling any distance through the air with a fine spray, as a great deal of the moisture will evaporate before it reaches the soil.

Sprinkle as much as possible in the evening or morning, to avoid excessive water loss through evaporation.

During midsummer we frequently observe homeowners giving the lawn, as a matter of course, a daily ten-or-fifteen-minute "drink," often with a heavy stream of water. These brief wettings cannot do more than moisten the surface, and most of this moisture is lost to the air within a few hours. A weekly or even bi-weekly soaking to a depth of several inches will maintain more moisture in the soil than frequent light sprayings, and is usually sufficient to keep lawn grass alive during the summer.

Adapt Watering to the Kinds of Grasses in the Lawn

Technique of watering can encourage the lawn towards Kentucky Blue Grass or the weedy Crab Grass, even though the turf may be a mixture of the two.

Kentucky Blue Grass is a perennial: it keeps growing year after year from underground stems; and once established, does not need to seed. It grows moderately in the autumn, staying green well into the winter, and resumes luxuriant growth in the early spring. However, it cannot stand a hot, dry summer. If soil temperatures rise too high, it dies. Normally, it remains more or less dormant during the late summer months.

Crab Grass, on the other hand, is an annual: it must mature seeds before winter, for with the first frosts the plant dies, and only its seeds will carry it over to the next season. It has some serious disadvantages. In the autumn it becomes brown with the early frosts, and in spring, because the seeds do not germinate until late, the lawn is without a thick green cover of young plants. It is more shallowly rooted than is Blue Grass, and coarser later in the season. But for surviving a blistering summer it has no peer. Crab Grass can eke out an existence in the hottest weather, with no encouragement and with only a meager supply of water.

If we are striving for a Blue Grass lawn, then, we should water (and fertilize) so as to encourage this grass at the expense of its competitors during its active growing season, i.e., chiefly in spring and autumn. During the summer Blue Grass is semidormant and needs to be watered only enough to keep it alive. Watering more than this does the Blue Grass lawn no good, and tends to encourage its competitors (Crab Grass and weeds) which are not dormant at this season.

Infrequent but thorough and deep watering keeps the Blue Grass alive in summer, while not encouraging its competitors any more than can be helped.

Shallow-rooted Crab Grass, on the other hand, thrives under the frequent, light summer sprinklings so often observed. Moreover, such light sprinklings moisten only the surface of the soil; and the deeper Blue Grass roots tend to grow towards this zone of moisture rather than into the lower topsoil and subsoil. If, as usually happens within a day or two, the moist surface layer dries out and cakes, the roots may die and the plant be weakened.

Both kinds of watering help the shallow-rooted Crab Grass. Only deep watering helps the Blue Grass, while shallow watering may actually be detrimental to it.

A NEW WEAPON AGAINST LAWN ANTS

Chlordane is a real cure

Katherine Palmer Plumb

Reprinted from *House Beautiful Magazine*, August, 1948, with drawing added

FOR a long time entomologists have been suggesting materials and methods for getting rid of ants. There have been stomach poisons that have to be hidden from children and pets, contact poisons that lose toxicity after a certain amount of exposure to sun and air, and repellents that scatter the workers from one field of labor to another. All were effective after their fashion, but all unsatisfactory for one reason or another.

At long last there is an insecticide that really "does in" ants. In experiment after experiment in Rhode Island and Connecticut last summer, a single application of Chlordane solved the ant problem.

The American lawn ant (*Lasius niger* variety *americanus*) is the worst offender on home grounds and in golf turf. This tiny brown creature piles up a small sand dune directly above its nest. A single crater is innocent enough, but when colonies multiply, something must be done.

Tests on Ants

Fortunately, Dr. Theodore Kerr of the Rhode Island Experiment Station had tested many insecticides in the laboratory. He selected materials that gave best results indoors and tried them on the turf plots at Kingston. Chlordane was far superior, as an ant control, to eleven other insecticides tested.

He tried Chlordane at twelve different dilutions in plots on golf courses at the Station. He found that the lawn ant was controlled by a single application of 50 per cent wettable Chlordane powder.

mixed at the rate of 8 ounces in 25 gallons of water. The suspension was sprayed evenly, using a power sprayer, over 25-foot-square plots of closely clipped grass. In every instance, ants disappeared almost 100 per cent within two days, and none had invaded these areas a month later. A watering can, or any garden sprayer that will distribute the insecticide evenly, can be used in treating the home lawn.

Independent tests were conducted in Connecticut by John Schread. In addition to success in an allover treatment of plots at weaker dilutions than those used in Rhode Island, but washed in with 50 to 60 gallons of clear water per 1000 square feet after treatment, Mr. Schread had good results by feeding Chlordane into individual nests. He placed one-eighth teaspoonful of the 50 per cent wettable powder directly in the hole at the top of each nest and washed the insecticide down into the ant galleries with water. He suggests that this method might be practical for the gardener who discovers a few craters on his lawn. Water may be applied from a hose at low pressure, or from a sprinkling can with the nozzle removed.

Chlordane will also kill carpenter ants, mound builders, other soil-infesting ants, and house ants.

Apparently it has a three-way action against insects. It is a contact poison and a stomach poison, and it gives off lethal fumes. It paralyzes the ants as they walk through it. Thus workers, on their foraging expeditions in a treated area, are killed. Since the queen, children, nurses, and soldiers of a colony depend upon the workers for food, they are starved, or killed by contact with the insecticide if they try to leave the nest.

Tests for Safety

Tests with rats have shown Chlordane to be about as toxic to warm-blooded animals as DDT, but it has this advantage: it is more poisonous to many insects than DDT, and therefore the same results



Lynwood M. Chace photo

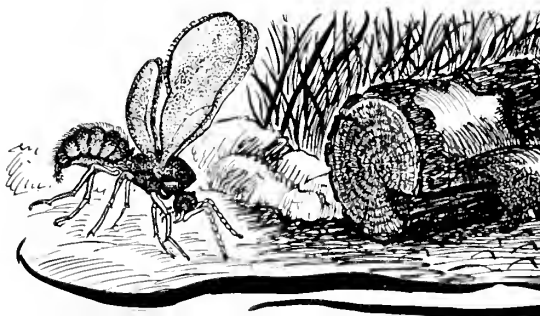
may be obtained with smaller doses. Workers who have handled the chemical in factories, chemists in laboratories, and others have suffered no ill effects from contact or inhalation. Sheep have been grazed on pastures treated at the rate of 4 pounds per acre; adult chickens have been fed exclusively for several days on grasshoppers killed by Chlordane; and dogs have been dipped in an emulsion containing 5 per cent Chlordane and petroleum. In no case was any injury noted.

While these experiments are not all-inclusive, entomologists believe there can be little danger to animals or children when Chlordane is used on lawns according to directions. However, it is always wise to handle a new material with care.

The new insecticide is appearing under many trade names, among them Dowklor, Synklor, Cook-kill, Colorado 44, Toxichlor, R-H, S-W Chlor-Spra, Chlordust, and Aero Cyanamid Granular.

Read the label, looking for the word "Chlordane"; and remember that the 50 per cent wettable powder gave best results in the ant experiments.

Typical breeding place for ants



KNOW YOUR CARPET GRASS

*It is different from St. Augustine,
and each has its place*

C. B. Webster

Condensed from *Southern Seedsman*,
December, 1947

CARPET Grass isn't St. Augustine Grass. The trouble lies in local usage of words. Often we hear good citizens refer with pride to their beautiful Carpet Grass lawns. One glance at any such lawn in the Fort Worth territory will show that it is St. Augustine Grass.

St. Augustine Grass

St. Augustine Grass is *Stenotaphrum secundatum*. Our country is apparently the only place in which it is called St. Augustine Grass. The Australians and South Africans refer to it as "Buffalo Grass." It is an introduced grass, probably from some island of the Pacific Ocean. (There is one variegated form, *Stenotaphrum secundatum* var. *variegatum*, which differs from the form used in our lawns by having white-striped leaves. This variety is most often seen in use as a basket plant.) Because this grass does not make seed frequently, it is commonly propagated by cuttings of the stolons, and is sold by the square foot or square yard of sod.

Once believed to be suited only to our Gulf Coast, St. Augustine Grass sod is now being planted as far north as Dallas and Fort Worth with much success. A coarser grass than Bermuda, it is replacing Bermuda as a lawn grass because it grows well in heavy shade, stays green during dry weather, stays green longer in the fall, greens up earlier in the spring (if not too hard hit by cold weather) and makes a generally more attractive turf, in the opinion of many people. We know



U.S.D.A. photo

St. Augustine Grass

of at least one rancher who is planting St. Augustine Grass sod in his heavily wooded Live Oak pastures. Not only is this grass drought resistant after it becomes established, but it lived through

the subzero weather at Fort Worth during the winter of 1946-47 with almost no killing where the grass had made a good cover.

Occasionally St. Augustine Grass produces seed, and all that I have seen has been viable. But the seeds are formed and imbedded in one side of an enlarged, flattened corky stem, and are not easy to break free. And so sod will no doubt continue to be the common way to increase and spread this very excellent southern grass.

Carpet Grass

Carpet Grass is *Axonopus compressus*. It, too, is a creeping, stoloniferous perennial grass. It "likes" moist alluvial and mucky soils, as does St. Augustine Grass; but unlike St. Augustine Grass, it does not grow well on sandy upland soils. It is used as a lawn grass in adapted locations. It is a native plant of the moist soils of the Gulf Coastal Plain from Texas to North Carolina. It is not drouth resistant. It is propagated from both sod and seed. Much seed is produced commercially in Louisiana. The seed stems of Carpet Grass are tall and slender (up to 15 inches above the leaf growth when permitted) in contrast with the short, coarse seed stem of St. Augustine Grass. Neither leaves nor stems are quite so coarse, generally, as those of St. Augustine Grass.

Carpet Grass cannot be expected to succeed in lawns in localities west of a line that curves northward from Bay City to Madisonville, Mineola, Mt. Pleasant, and Texarkana, in Texas. Nor can it be depended on north of Texarkana, and Clarksville, Mississippi. However, I cannot guarantee that someone will not "call me" on that limitation. It hasn't been many years since we were certain that St. Augustine Grass would never stay over winter in lawns north of San Antonio, Bryan, and Lufkin, Texas.

One thing you can be sure of at the moment: if you buy Carpet Grass seed it is almost certain to be Carpet Grass seed. If anyone offers for sale ANY seed

of St. Augustine Grass, make him show you the grass plot from which the seed was harvested. One of these days seed of this grass will be available on the market, but that time is not yet. Carpet Grass and St. Augustine Grass are neither the same thing, nor do they have equal value as lawn grass. Between the two I'll take St. Augustine every time—for either lawn or pasture.

Carpet Grass

U.S.D.A. photo



THE ROBOT GREENHOUSE

Latest aid in starting seeds and rooting cuttings indoors

R. Milton Carleton

Condensed from *Flower Grower*, January, 1948, with the addition of pictures of individual plants

BEFORE leaving on a trip, I made 200 cuttings of *Euonymus Fortunei* var. *vegetus*.* During my absence the cuttings were not watered, no one looked at them, and they did not see the light of day. Two weeks later I returned, to find 95 per cent of them rooted and ready to pot up. What was the "catch"?

* Illustrated on title page.—Ed.

I used a relatively new device called a "Glenn Dale propagator," developed by Dr. Vernon Stoutemyer at the Glenn Dale Station of the United States Department of Agriculture, to facilitate propagation of rare and difficult plants. This amazing garden gadget has also been found practical for raising plants from seed.

The Glenn Dale propagator is available as a factory-made unit, with a correctly designed reflector; it promises to change all our ideas about what plants can be grown at home by the amateur gardener, working without the facilities of a conventional greenhouse. By simply changing the light quality of the fluorescent tubes, he can grow practically all the

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A robot greenhouse with cuttings and seedlings

Kelly R. Powell photo





Branch of Japanese Yew (*Taxus cuspidata*)

plants he formerly had to buy from a commercial greenhouse, with far less trouble than greenhouse propagation usually involves, and at the same time get even better results.

Cuttings

I have taken trimmings from my Japanese Yew hedge in spring—ordinarily considered the wrong time to root *Taxus* cuttings—and have had well-rooted cuttings within five weeks. This beats, by at least thirty days, my best record with cuttings taken at the ideal time and rooted in the customary way.

Other plants I have rooted include Chrysanthemums, *Impatiens*, Coleus, Velvet-plant, *Tradescantia*, Azalea, English Ivy, Geranium, Rosemary, Fuchsia, and both tuberous and fibrous Begonias—as varied a list as one can imagine. In practically every instance results were equal to or better than those from my conventional, on-the-surface greenhouse, and only about one fifth of the work was required.

Seedlings

At first I had some trouble growing healthy seedlings of flowers and vegetables. Finally, I raised the flats so that the surface of the growing medium was within 6 inches of the tubes. This increased the light intensity. Then, when I reduced the temperature almost 10° from that considered ideal, I was able to grow first-class seedlings.

I did not, however, find it possible to grow these seedlings inside the propagator much after the time their first or second leaves appeared. By supplementing the propagator with cold frames and hotbeds, all the flower and vegetable plants the average home gardener could use can be grown for a small fraction of what they would cost if purchased. The operating expense comes to a little over \$4 a month. The light is on twenty-four hours each day. Practically all subjects do as well under continuous light as they do on a sixteen-hour day. But since many plants will grow well with sixteen hours of light and eight hours of darkness, the economically-minded operator



Tradescantia

may install one of the clocks used for turning on lights in poultry houses. This will control the lighting and save current for eight hours each night.

House Plants

Tuberous Begonia fans find the propagator ideal for starting their tubers in spring. With heat, light, and moisture under perfect control, they get strong, early sprouting, which goes a long way toward producing early bloom. Dahlia enthusiasts use it in a similar way, sprouting the tubers in one end of the unit and rooting cuttings in the other.

The Glenn Dale propagator can be used the year round. In fall, new house plants can be started from plants salvaged from the garden before killing frosts. I find

it an ideal place to sprout rooted Paper White Narcissi when they are brought out of the dark. High humidity prevents blasting or drying out of flower buds before they open.

After a frost or two has taken off the foliage of deciduous shrubs, evergreens are at their best for making cuttings. These can be rooted and potted up, and then carried over in hotbeds, gradually hardened off, and finally stored in cold frames to await planting out in spring.

Annuals and Perennials

Many annuals should be sown early if large plants are wanted for spring. For instance, the double Petunias and *Vinca rosea* should go in about the time the evergreen cuttings have been rooted. From this time until after the soil warms up in spring, the propagator can be kept busy with annuals. Also, if clean, healthy plants of Geraniums, Petunias, Ageratum, and other bedding stock were potted up in fall and carried over in a sunny window, cuttings from these can be made all winter. These will be limited only by the space available in a sunny window or sun porch, where the resulting plants may be kept until spring.

After the rush of spring planting is over, perennials from seed take over. I know of no better place to start these than in an enclosed case that requires practically no attention until the seedlings are ready to transplant.

Softwood Cuttings

Early summer can be taken up with softwood cuttings of shrubs and perennials. This can be continued until August, for most species. In August, the gardener finds the propagator of greatest use in the germination of Delphiniums and Pansies, two valuable plants that cause trouble for most people. Not until you have started a batch of Delphinium seed in a cool basement will you appreciate this all-but-miraculous device. Instead of waiting until cool weather comes,

the home gardener can begin in mid-August.

Methods

Certain precautions should be observed in using the Glenn Dale propagator. The ideal **light** for growing cuttings is the fluorescent tube known as 3500° white. But seedlings grow long and spindly when subjected to this, even with the flats close to the tube. They need the quality of fluorescent light known as "daylight white." Where you are trying to grow both seeds and cuttings in the same unit, use the daylight white tube and place the cuttings at the end of the unit, saving the more concentrated light in the center for seedlings.

Regulation of **heat** worries a good many novice users of the propagator. If it is operated in a basement that stays close to 70° in hot weather, and doesn't drop below 50° in winter, all the heat necessary will come from the fluorescent unit and tube. If the temperature rises too much, it may be necessary to prop open the lid and ventilate. But this means frequent watering to make up for the loss of moisture by evaporation.

Don't let anyone talk you into using anything but vermiculite for the **growing medium**. All other materials offer problems that are nearly impossible to solve. Because it is sterile and contains no nutrients, vermiculite is a controllable material that does not vary. Lack of food value, of course, must be made up by watering the seedlings with liquid chemical fertilizers as soon as the seed leaves unfold.

Watering seems to present the biggest question mark for the inexperienced operator. If vermiculite in the flats is wet down thoroughly, but not so that water runs out of it, usually no further watering will be needed by most plants, until transplanting time arrives. A light spraying with a rubber bulb spray is usually enough.

After working with this unit for two years, I am convinced that it offers the



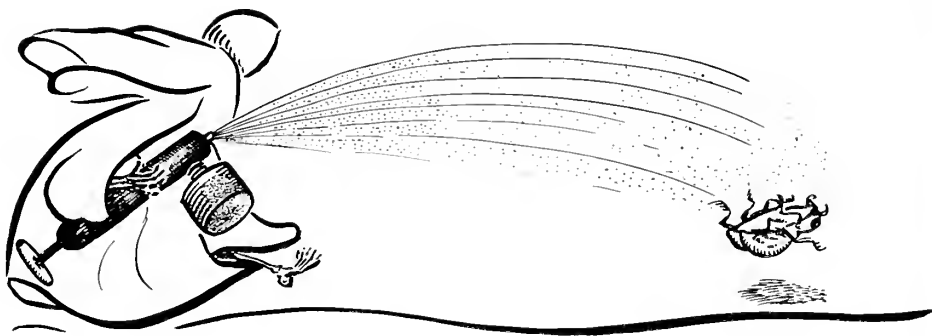
Begonia semperflorens

greatest single means of improving results from the home garden. At low cost, it gives the amateur the equivalent of a greenhouse costing a thousand dollars or more, except that he cannot use it to grow blooming plants to maturity.

Ageratum

Elsie M. Kittredge photo





NEW SPRAY MATERIALS

For insects and for plant diseases

Amanda Quackenbush

Condensed from *Flower Grower*, May, 1948,
with drawing added

DDT now has a definite place in the control of several garden insects. This is true also of a few other insecticides developed about the same time. These materials have been used widely by gardeners for several years, and they no longer can be classified strictly as "new." Since the advent of these materials, a goodly number of insecticides has been introduced each year. A few of the new ones are well worth the gardener's attention.

New Insecticides

Chlordane is a new organic insecticide which shows unusual promise as a control for Japanese beetle grubs in turf. It is the fastest-acting practical insecticide yet discovered for this purpose, killing grubs five times as fast as DDT. Also, less of the material is required to give effective control. Tests at the Connecticut Agricultural Experiment Station, last season, showed that Chlordane, at 8

pounds of actual material per acre, gave better control of Japanese beetle grubs in a heavily infested golf course than 25 pounds of actual DDT.

Whether the residual effect of Chlordane is as great as that of DDT (which will keep turf free of grubs for periods of at least five years) has not yet been determined. But it should be particularly useful to the homeowner who discovers in the spring that he has a heavy grub infestation in his lawn. The new insecticide will give a quick enough kill of grubs to put the lawn in condition so that it may present a green appearance by summer.

Chlordane is also the best material yet found for killing ants.*

In the household, Chlordane is excellent for the control of cockroaches, giving as high as a 90 per cent kill on the first application, and showing much promise against moths and carpet beetles. As an agricultural insecticide, Chlordane has shown up well in controlling several pests, including grasshoppers, aphids, and the curculio. On curculio, it has an advantage over lead arsenate in that it does not cause burn; however, since it is volatile, more frequent applications are necessary.

* See page 210.—Ed.

Rhothane is another of the chlorinated compounds. While somewhat less toxic against agricultural pests than DDT, in many cases it is also less injurious to plants. For this reason its use is preferred on such vegetables as Tomatoes and Cucumbers, which are harmed by DDT. Rhothane also shows promise as a specific against the Corn earworm.

Benzene hexachloride has shown much promise against several pests; but its peculiar musty odor has proved to be a serious drawback.

Chlorinated camphene, sold under the trade name of "Toxaphene," has had some success in the control of curculio on fruits.

The phosphates, a new group of insecticides, are all extremely toxic to man and animals, and must be used with extreme caution. One of them, parathion, will be on the market in limited quantities for the first time, in 1948, under the trade name of "Thiophos 3422." It is known to have a high toxicity against red spider mites, aphids, curculio, Japanese beetle adults, and various soil insects. Two other phosphates, hexaethyl tetraphosphate and tetraethyl pyrophosphate, also show promise against aphids and red mites.

New Fungicides

Dithane has already been used widely for two years on Potatoes, where it seems to take care of almost all diseases. In combination with DDT, it seems the best thing yet for controlling insects and diseases of Potatoes, and the use of DDT-Dithane sprays has resulted in greatly increased yields. In tests in some of the southern States, Dithane has proved very effective against flower spot on Azaleas.

Last year, a variant of Dithane, sold as Z78 or Parzate, appeared on the market. This is more stable and remains on

foliage longer than Dithane. Both Dithane and Parzate are good for several vegetable diseases other than those affecting Potatoes, notably Celery leaf spots and downy mildew in Cucurbits. They are injurious to fruit and Roses.

Phygon shows good control of several vegetable diseases, with no apparent harm to foliage. For control of Bean anthracnose it has proved far superior to Bordeaux mixture. Phygon should not be used on Potatoes; while it controls late blight effectively, it reduces yields at the same time. On Apples, Phygon looks promising for control of scab and bitter rot. However, it will give a dark discoloration on the skin of MacIntosh apples.

Puratized Agricultural Spray is specific for fruit diseases, particularly Apple scab. It has the disadvantage of leaving a poisonous residue. However, if the spray is applied before blossoming, this difficulty can be overcome. A variant of Puratized, sold under the trade name of Puraturf, is outstanding for control of fungus rots in lawns.

Zerlate is a close cousin to Fermate, one of the first of the new organic fungicides. It is white in color; and so it does not possess the disadvantage of Fermate, which leaves a black deposit on foliage. Zerlate has been used with success in the control of several vegetable diseases, especially anthracnose and early blight or target spot of Tomatoes. But it fails on late blight of Tomatoes and Potatoes. It cannot be used on Apples or Roses, because it tends to burn these plants. Zerlate has recently proved somewhat successful on bacterial leaf spot of Peaches.

Several new turf fungicides based on the metal, cadmium, look promising. One has already been named Crag. These should be appearing on the market by 1949 under various trade names.

THE TRUTH ABOUT FERTILIZERS

Neither compost nor commercial fertilizers can give the best results if used alone

Dorothy Ducas

Reprinted from *House Beautiful Magazine*, April, 1948, with drawings added

ARE you a home gardener who has been urged to run your garden exclusively with compost? Have you been lured by the prospect of fine vegetables and lovely flowers obtained through the use of homemade humus, prepared from grass clippings, leaves, weeds, garbage, and various forms of manure? Do you wonder if it is true that this organic matter will overcome all the ills of your garden—plant diseases, weeds, poor taste in vegetables? Have you secretly wondered if your neighbor, who buys fertilizer in bags, isn't smarter than you? If you are either an all-humus gardener or devoted exclusively to chemical fertilizers, this article is for you.

House Beautiful, aware of the bitter conflict between organic gardening addicts and artificial fertilizer people, has been conducting an investigation to clear away the mist of confusion in the minds of average gardeners. To find out which side is right, we talked with exponents of organic gardening, whose leader in the United States is J. I. Rodale of Emmaus, Pennsylvania, editor of *Organic Gardening Magazine* and disciple of the late Sir Albert Howard, British leader of the "composts-only" crusade. We have consulted the National Fertilizer Association, whose manufacturer-members produce the modern commercial fertilizers. We visited the United States Department of Agriculture's Experiment Station at Beltsville, Maryland, where soil engineering is under close study and test. We delved into the voluminous literature on the sub-

ject, visited chemists, got in touch with many agricultural scientists. And this is what we learned:

Organic matter, or humus, the mysterious dark substance of the soil which is made up of organic compounds resulting from decomposition of vegetable and animal matter, is important for successful growing of plants of all kinds. But so are artificial fertilizers, which contain plant food necessary to supplement or replace the natural foods of the soil, that either were low to begin with or are running low in most places.

Humus and chemical fertilizers do two entirely different sets of things for your garden. Both are important because they complement each other.

Humus primarily promotes in the soil a proper texture that allows air to come into it. It's largely a mechanical virtue. Humus increases the soil's waterholding capacity, prevents the washing and blowing away of topsoil (known as erosion) and the loss of valuable minerals in solution with rain (known as leaching). It also makes the soil easier to cultivate.

The basic reason why the average home gardener cannot depend upon an all-compost diet for his soil is that he does not know what shortages exist in his soil or what his compost heap contains. The humus created from compost cannot be counted on to provide plant nutrients in exact amounts needed to feed the roots of plants.

Some soils are naturally rich in elements that help plants to grow. Others are deficient. And almost all soils that have been worked by man for a long period have lost some of their essential elements—if, indeed, they ever had enough. Every time you pick a flower or use a carrot from your garden you probably are removing some of the elements essential for normal growth. Unless you

replenish the reservoir of usable nutrients in the soil, it gets steadily poorer.

Chemical fertilizers provide the essential elements for plant growth that are lacking in the soil of the garden in sufficient amounts or in usable forms. Just which ones are needed, and in what amounts, can be determined by soil tests available for the asking through State Agricultural Stations of almost every State.

We believe, as do the scientists, that you should pay attention both to the structure of your soil and to its basic nourishment content for plants. But, of the two, we believe soil feeding by chemical means probably is more important to the average gardener. If the trouble is "anemia" of your earth, it may look like good earth and still be deficient. You can easily see if the soil is hard or lumpy, difficult to cultivate after a rain, or very sandy, and correct it through use of compost or manure. If, in addition to compost, you use a ready-prepared chemical fertilizer, containing elements known to be most needed in the soil of your area, you can give your soil all it needs.

Why the Controversy?

Let's look over the charges that have been made in this battle of organics versus chemicals. Where have the misconceptions arisen?

The advocates of organic gardening make two claims:

That the use of compost will improve crops.

That the use of chemicals is harmful to crops.

To the first contention there is no refutation. The second contention—that the use of chemicals is harmful to crops—is vigorously denied by scientific authorities.

Mr. Rodale has stated that you can run a garden exclusively with the use of compost and "have the finest vegetables obtainable." A flat contradiction of this would be foolhardy. If the soil is naturally rich in plant food, or if compost happens to have sufficient amounts of the proper elements, you can raise fine vege-

tables. But this does not prove that the use of chemicals will prevent raising just as fine vegetables.

The Case for Compost and Organic Gardening

There are several advantages in organic gardening on which there is general agreement:

1. By adding enough organic matter, a heavy soil can be made looser, more crumbly and friable, so that both water and air (necessary for good root growth) can move more freely in it. As a result, it is easier to cultivate.

2. In a light soil organic matter holds the soil particles together, helping to anchor them against serious erosion, and reducing leaching.

3. Organic matter provides food for soil bacteria and other organisms that tear down the organic matter and make it part of the soil itself.

4. Organic matter provides some of the enormous amounts of nitrogen needed by plants.

5. Organic matter, in the process of decomposition, releases plant foods already in the soil by turning them into soluble compounds that can be absorbed by the roots of plants, as they could not have been absorbed in their original state.

These are all important considerations.

But there are five more claims made by the compost-and-humus urgers which are unsupported by scientific proof. They say that by using compost without commercial fertilizers:

Claim 1. Weeds are greatly reduced.



This has never been proved. All plant life requires basically the same foods. Soil good for flowers or vegetables also is good for weeds.

Claim 2. Plant disease is reduced.



False. Disease more often strikes the weak than the healthy. Reduction of plant disease is a result of a totally healthy condition, i.e., good soil and plenty of the right minerals in proper balance, not merely the addition of humus.

Claim 3. There are fewer insect pests.



Not true. Insects seek the same elements for food that man, animals, and plants do. They will get them wherever the elements are present in most palatable form. You'll need sprays to protect your organic garden just as much as you ever did.

Claim 4. Larger yields are obtained.



False. If there has been constant neglect of the soil structure, even though chemical fertilizers were used, addition of compost could possibly increase yields. But both organic matter and sufficient plant nutrients are necessary for good yields.

Claim 5. Food tastes better and has more nutritive value.



Taste is a matter of opinion. However, nutritive value can be proved. Experiments at the University of California showed there was no difference in nutritional quality of grasses produced in highly organic soils and those grown without any soil whatsoever, but fed entirely by chemicals in an inorganic water culture. The grasses were fed for twelve weeks to two sets of guinea pigs; the growth of the two groups was about the same.

Are Chemical Fertilizers Harmful?

If the adherents of organic gardening would stick to their primary contention—that humus is beneficial—they would win more followers. When they launch out against the use of the very products that have been responsible for greatly increasing crop yields, earlier crop maturity, better quality, and preservation of soil fertility, they run diametrically opposed to scientific findings.

Professor Emil Truog, Chairman of the Department of Soils at the University of Wisconsin, has written: "Absolutely no evidence exists to the effect that the judicious use of mineral fertilizers is at all injurious to soils, or tends to produce crops which are unsatisfactory as feed for animals or food for man."

Professor Truog explains that the elements used by plants for new growth are, for the most part, mineralized by soil bacteria. Organic nitrogen in humus, for example, may become nitric acid, a corrosive mineral acid. But in good soil, well supplied with lime, the nitric acid combines with lime and other bases of

the soil to make a neutral, non-corrosive salt, calcium nitrate. *There is absolutely no difference between the calcium nitrate produced in the soil and that made in a fertilizer factory!* A fertilizer factory merely does, in a few hours, what it takes nature months and years to accomplish.

In the light of this rudimentary chemistry, let's consider the charges of the organic gardening school against chemical fertilizers:

Charge 1. Chemical fertilizers poison the soil.

No, because they are not poison when you buy them, even if they were in their original state.

Charge 2. Chemical fertilizers kill earthworms.

They don't. Earthworms, frequently called "nature's plow," are very helpful creatures. They pulverize and aerate the ground, creating conditions favorable to absorption of rain. They also act as soil scavengers, and their castings are as rich in elements as the soil in which they live. But earthworms are alive, moving from unfavorable to favorable spots, seeking the same food elements other forms of life do, avoiding dangerous concentration of elements.

Charge 3. Chemical fertilizers create hardpan.

False. A hard-packed soil in which plant roots cannot function properly is the result of lack of organic matter, not the presence of chemicals. Improper working of the earth, and movement of heavy farm machinery or many feet on topsoil, particularly after rains, also help make hardpan.

Charge 4. Chemical fertilizers kill beneficial bacteria.

No. Bacteria, whether harmful or beneficial, get their food from the organic matter they tear down and from the plant food present.

Charge 5. Chemical fertilizers make seeds impotent.

False. These claims never have been demonstrated by scientific studies. Indeed, many experiment stations have pro-

duced stronger and healthier varieties of plants with the use of inorganic chemical fertilization than they were able to grow with compost and organic matter. Naturally, the experienced gardener knows that proper application of fertilizer calls for no more than very small quantities in direct contact with the seeds.

The Use of Compost

Compost heaps have been a familiar part of farming for thousands of years. Every gardener should know what compost is and how to make it.* There are few gardens that will not be benefited by use of decayed green or dry wastes, properly put together, and there is none that will be harmed by it.

Many gardeners merely throw grass clippings, corn husks, and other green stuff in a pile during the summer, cover it with earth, and in the fall add other refuse from the garden. Without the usual manure or other animal matter to provide heat, such compost will decay slowly and may not be ready for a year or more. If it is buried, however, the gardener can afford to wait. If he makes one pit each fall, he can dig up an old one every spring, add chemical fertilizers or not, as indicated, and have enough humus to enrich his garden. The great appeal of making compost is that you create something wonderful out of nothing. You make it from things you would ordinarily burn or throw away.

Each gardener is the best judge of whether his soil needs compost. However, we asked Dr. H. B. Siems, Director of Research for the Plant Food Division of Swift & Co., which regions, in general, require it most, and got from him this advice:

"In areas of sandy soil, such as along the east and Gulf coasts, spots in the Great Lakes States, New England, and sections of California, organic matter will increase the water-holding capacity of the soil, acting as a sponge, preserving

* Brooklyn Botanic Garden Leaflet, New Series, No. 2, available on request.—Ed.

precious moisture for times of drought, and at the same time holding minerals in the soil.

"In those parts of the country where the soil is high in clay, a large part of the nation—Southeast, Midwest, in localized areas almost everywhere—you want humus to loosen the soil. Clay holds water well, but it is hard to farm, should not be worked when wet, and gets lumpy and hard when dry. Addition of organic matter or sand, or both, loosens a clay soil so that air can get in, and excess water can get out. Rooting is hampered by lack of air. Garden plants don't like "wet feet." In clay-soil regions, if you can't obtain humus, sand alone will help: in cities a ready supply of organic matter may not be available.

"If your home is on the dark-colored prairies of the Corn Belt, you may not need humus. This is the part of the country where the organic content of the soil is high. The problem here is to preserve the organic matter you have—by crop rotation, plowing under of crop residues, use of cover crops, and, when indicated, prepared fertilizers."

Fertilizers, Partners of Humus

Three important elements likely to be in short supply in your garden are nitrogen, phosphorus, and potassium. Com-

mmercial fertilizers contain guaranteed amounts of these three, proportioned to the general requirements of the area in which you live, frequently plus some of the other essential elements. This balanced plant food usually is sufficient, used according to manufacturer's directions or in accordance with the recommendations of your State Experiment Station.

If you have an especially acid soil, you should apply lime, and then use commercial fertilizer, as farmers do. But *seek expert advice* on the kind and amounts of lime to use in your garden! The usual lime you get at a garden supply store is hydrated, distinctly alkaline. Scatter it evenly, mix it thoroughly with the soil. Where it touches a plant it can burn the leaves. Avoid the possibility by applying it a week or two before planting. And don't *over-lime*!

Get professional advice before you fertilize. Follow directions. And, remember, you can cheat your plants of something they need, even though you use the right *amount* of fertilizer. It must contain the things your earth especially lacks. Have your soil tested—maybe not every year, but every few years, certainly.

Compost and commercial fertilizers are a team for garden improvement. Use them as they work best—together.

ROOT-PRUNING TREES

Condensed from *The Rural New Yorker*,
August 21, 1948

Many years ago we tried moving some of the shapely Cedar trees from old fields to our lawn, but we seldom had success. A neighbor of ours seldom had a failure, no matter what he moved: Cedars, Hemlocks, Spruces, Pines, small Oaks, Maples, and Beeches; each tree seemed to grow as though it had never been transplanted. Asked his secret, he replied:

"When trees grow wild, the roots spread out in every direction. When you attempt to move such a tree, frequently you lose half the root system; and so you must make a corresponding pruning in the top, which spoils the looks of the tree for several years.

"I decide what trees I hope to move some day. Then I dig around these trees just as if I intended to move them right then. I usually do this in the late summer; but I don't attempt to pry the trees

loose. I simply cut off, with pruning shears, all the roots that extend beyond a certain point, a rough circle that I have spaded around the tree. Then I carefully replace the soil and leave the tree to heal itself up and form a more compact ball of roots. Sometimes I have left a tree, thus root-pruned, for two years or more. When the time comes to move it, usually in the spring (although evergreens can

be moved successfully in the fall) the trees are ready to be moved without injury and without having their growth retarded."

This method of root-pruning applies equally well to vines and shrubbery, or even fruit trees. Try it. You'll be surprised what root-pruning will do to help you.

C. O. MORRIS

HOW FAST DO TREES GROW?

Chief concern of the planter

E. L. Kammerer

Condensed from *Morton Arboretum Bulletin of Popular Information*, March, 1948

FOR a number of years data have been collected and records kept of the rates of growth of the various tree species represented in the Morton Arboretum. By presenting the facts in pictorial graph form, basic information becomes available at a glance to guide and assist anyone interested in learning how fast trees grow. See pages 226 and 227.

Space limitations have necessitated confining our graph to those ornamental trees which are most likely to flourish hereabouts [Lisle, Illinois] in home ground landscapes. Forty-six types are represented.

The growths attributed to the various species were arrived at by computation from actual measurements, and represent the relative heights which may be expected to be attained during a ten-year period. In every case it was assumed that trees 6 feet in height were used at the time of planting, sites meeting their requirements provided, and average care given them. Obviously, these results would differ radically in other areas and under different conditions.

Growth is subject to many influences; and in order to afford a better insight into the entire growth picture, it may be of advantage to enumerate the chief factors affecting it. Briefly, these are:

1. The inherent traits of individual species and varieties, traits which may be influenced by the source of seed or of the parent plants. As an example, plants propagated asexually from a fast-growing parent may be expected to inherit the same characteristic.

2. Light. Trees planted closely together in plots will grow at a different rate from isolated specimens.

3. Soil. All-important.

4. Moisture. Of major influence.

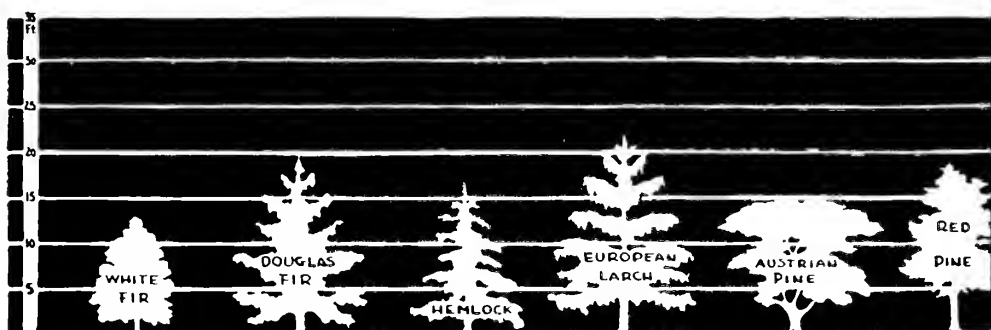
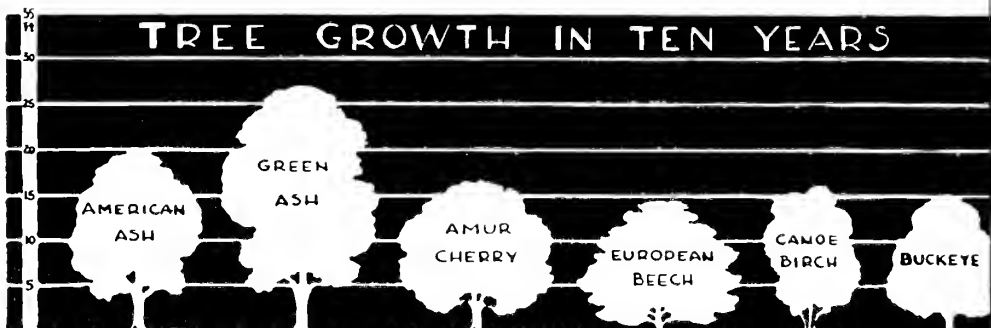
5. Temperature. In addition to the effects of extremes, such factors as the length of the growing season are significant.

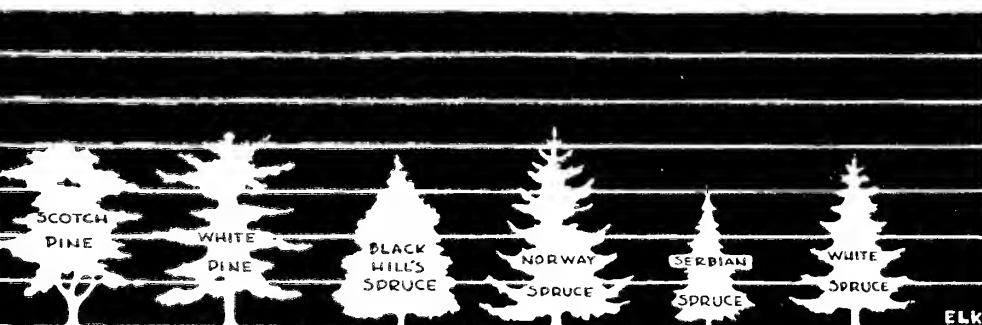
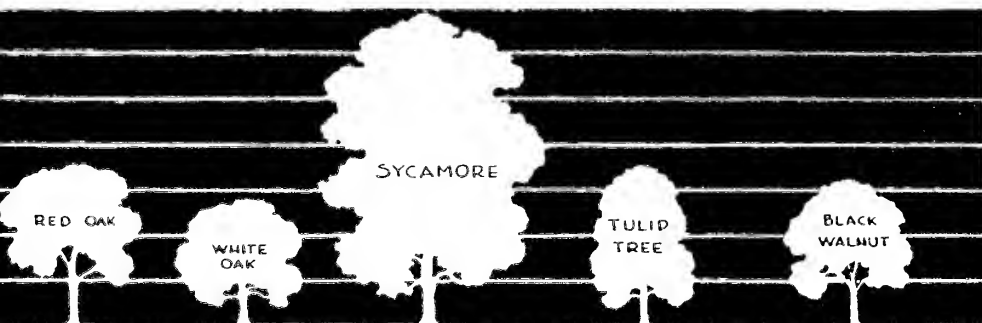
6. Fertilizing. Of utmost importance. None of the trees reported on has been fertilized.

7. Cultivation. The amount of cultivation plainly shows in growth.

8. Whether plants are newly set or long established. Transplanting retards growth for several seasons, after which a more uniform rate occurs. Once past the juvenile stage, however, growths tend to decrease.

TREE GROWTH IN TEN YEARS







“—ADD WATER TO MAKE 100 GALLONS”

Conversion chart of weights and measures for spray and dust recipes

Nelva M. Weber

Condensed from *The Home Garden*, July, 1948, with drawing added

THE home gardener with four new Apple trees, aged 2 years, must feel somewhat nonplussed when he surveys his flit gun and the usual 100-gallon spray formula. The following tables of information are designed to help.

3 level teaspoons equal 1 level tablespoon
2 tablespoons equal 1 fluid ounce
8 fluid ounces equal 1 cup
2 cups equal 1 pint
2 pints equal 1 quart

4 quarts equal 1 gallon

1 gallon equals { 4 quarts
8 pints
16 cups
128 fluid ounces
231 cubic inches

12 fluid ounces equal 1 pound

16 ounces (dry measure) equal 1 pound

For measuring, buy a standard measuring cup and a set of measuring spoons. The household “tablespoon” probably isn’t one at all. The ordinary china cup may hold anything from a cup down.

The following conversion tables include the common spray materials for orchard, vegetable garden, and flower border in their usual dilutions. In 100-gallon mixtures, it is wise to weigh the ingredients; for smaller quantities, it is more convenient to measure them.

CONVERSION TABLE FOR DRY SPRAY MATERIALS

Note: All measurements are level

With 100 gallons of water use:	With 10 gals. of water use:	With 3 gals. of water use:	With 1 gal. of water use:	With 1 quart of water use:
2½ lbs. hydrate lime 4 lbs. zinc sulphate	¾ cup	3½ tbsp.	1¼ tbsp.	1 scant tsp.
2 lbs. arsenate of lead 2 lbs. calcium arsenate 3 lbs. hydrate lime 4 lbs. wettable sulphur 6 lbs. zinc sulphate	1 cup	4¾ tbsp.	1½ tbsp.	1 tsp.
2½ lbs. arsenate of lead	1½ cup	5¼ tbsp.	1¾ tbsp.	1⅓ tsp.

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CONVERSION TABLE FOR DRY SPRAY MATERIALS continued

With 100 gallons of water use:	With 10 gals. of water use:	With 3 gals. of water use:	With 1 gal. of water use:	With 1 quart of water use:
2½ lbs. calcium arsenate 4 lbs. dry lime sulphur 2 lbs. ground derris 0.5% 4 lbs. hydrate lime 5 lbs. wettable sulphur	1¼ cup	6 tbsp.	2 tbsp.	1½ tsp.
3 lbs. arsenate of lead	1½ cup	6½ tbsp.	2¼ tbsp.	1⅔ tsp.
3½ lbs. arsenate of lead 3 lbs. calcium arsenate 5 lbs. dry lime sulphur 6 lbs. wettable sulphur	1½ cup	7½ tbsp.	2½ tbsp.	1¾ tsp.
4 lbs. arsenate of lead 3½ lbs. calcium arsenate 6 lbs. dry lime sulphur 6 lbs. hydrate lime	1¾ cup	8½ tbsp.	2¾ tbsp.	2 tsp.
4½ lbs. arsenate of lead 4 lbs. calcium arsenate 3 lbs. ground derris 0.5% 8 lbs. wettable sulphur	2 cups	9¾ tbsp.	3¼ tbsp.	2½ tsp.
5 lbs. arsenate of lead 8 lbs. dry lime sulphur 8 lbs. hydrate lime	2¼ cups	11¼ tbsp.	3¾ tbsp.	2¾ tsp.
5 lbs. calcium arsenate 4 lbs. ground derris 0.5% 10 lbs. wettable sulphur 6 lbs. Bordeaux Powder	2½ cups	12 tbsp.	4 tbsp.	1 tbsp.
6 lbs. calcium arsenate 10 lbs. dry lime sulphur 5 lbs. ground derris 0.5% 10 lbs. hydrate lime	3 cups or 1 lb. lime or lime sulphur	15 tbsp.	5 tbsp.	1¼ tbsp.
8 lbs. arsenate of lead 12 lbs. dry lime sulphur 12 lbs. hydrate lime 8 lbs. Bordeaux Powder	3⅔ cups or 1¼ lb. lime or lime sulphur	1 cup	5¾ tbsp.	1½ tsp.
9 lbs. arsenate of lead 8 lbs. calcium arsenate	4 cups	1¼ cup	6½ tbsp.	1⅔ tsp.
16 lbs. hydrate lime	4¾ cups or 1½ lb.	1⅓ cup	8 tbsp.	2 tbsp.
20 lbs. dry lime sulphur 20 lbs. hydrate lime	6 cups or 2 lbs.	1⅞ cup	10 tbsp.	2½ tbsp.
25 lbs. dry lime sulphur 16 lbs. Bordeaux Powder	7½ cups or (2½ lbs. dry lime sulphur)	2¼ cups	¾ cup	3 tbsp.
30 lbs. dry lime sulphur 20 lbs. Bordeaux Powder	9 cups or (3 lbs. lime sulphur); 2 lbs. Bordeaux	2¾ cups	1 cup	4 tbsp.

CONVERSION TABLE OF LIQUID SPRAY MATERIALS

Spray Material	With 100 gals. water use:	With 10 gals. water use:	With 3 gals. water use:	With 1 gal. water use:	With 1 qt. water use:
Lime Sulphur	11 gallons 6 gallons 2½ gallons 2 gallons	4½ quarts 5 pints 1 quart 3¼ cups	5¼ cups 3 cups 1¼ cup 1 cup	1⅞ cup 1 cup 6½ tbsp. 5 tbsp.	7 tbsp. 4 tbsp. 5 tsp. 1¼ tbsp.
Nicotine Sulphate—40%	4⅛ pints 2½ pints 1½ pint 1¼ pint 1 pint ½ pint	13 tbsp. 8 tbsp. 4¾ tbsp. 4 tbsp. 3¼ tbsp. 1⅔ tbsp.	4 tbsp. 2 tbsp. 1½ tbsp. 1½ tbsp. 1 tbsp. 1½ tsp.	4 tsp. 2½ tsp. 1½ tsp. 1¼ tsp. 1 tsp. ½ tsp.	1 tsp. ⅔ tsp. ½ tsp. ⅓ tsp. ¼ tsp. ⅛ tsp.

DILUTION CHART FOR LIQUID SPRAY INGREDIENTS

Recommended Dilutions	With 100 gals. water use:	With 10 gals. water use:	With 3 gals. water use:	With 1 gal. water use:	With 1 qt. water use:
1-8	11 gallons	4½ quarts	1⅓ quart	1 pint	½ cup
1-16	6 gallons	2⅓ quarts	1⅓ pint	1 cup	¼ cup
1-25 (4%)	3¾ gallons	1½ quart	1 pint	⅔ cup	3 tbsp.
1-40	2½ gallons	1 quart	1¼ cup	6½ tbsp.	5 tsp.
1-50 (2%)	2 gallons	1½ pint	1 cup	5 tbsp.	4 tsp.
1-75	1½ gallon	2½ cups	¾ cup	3¾ tbsp.	3 tsp.
1-100 (1%)	1 gallon	1½ cup	½ cup	2½ tbsp.	2 tsp.
1-200	2 quarts	¾ cup	4¼ tbsp.	1¼ tbsp.	1 tsp.
1-250	1⅔ quart	⅔ cup	3½ tbsp.	3½ tsp.	1 scant tsp.
1-300	1½ quart	9½ tbsp.	3 tbsp.	3 tsp.	¾ tsp.
1-400	1 quart	6½ tbsp.	2 tbsp.	2 tsp.	½ tsp.
1-600	1½ pint	5 tbsp.	1½ tbsp.	1½ tsp.	⅓ tsp.
1-800	1 pint	3¼ tbsp.	1 tbsp.	1 tsp.	¼ tsp.

WEIGHT AND MEASURE OF SPRAY AND DUSTING MATERIALS

Material	One Ounce =	One Pound =
Arsenate of Lead	4½ level tbsp.	4½ cups
Calcium Arsenate	5 level tbsp.	5 cups
Corrosive Sublimate Powder	1 level tbsp.	1 cup
Cryolite	8 level tsp.	2⅔ cups
Dry Lime Sulphur	3 level tbsp.	3 cups
Dusting Sulphur	2½ level tbsp.	2½ cups
Ground Derris Root (0.5%)	6 level tbsp.	6 cups
Hydrate Lime	3 level tbsp.	3 cups
Prepared Bordeaux Powder	4½ level tbsp.	4½ cups
Pyrethrum Powder	5 level tbsp.	5 cups
Talc	3 level tbsp.	3 cups
Wettable Sulphur	2½ level tbsp.	2½ cups

THE REDWOOD OF CHINA

Discovery of the living tree in Asia, and of its fossil ancestors elsewhere

Ralph W. Chaney

NOWADAYS it is a rare experience to discover a new tree genus in the North Temperate Zone. Any plant as large as a tree has in most cases been sighted long ago, either by a botanical explorer or by a keen-eyed traveler. Even in the world of fossil plants, trees of the forests of millions of years ago are now for the most part well known.

Hence, it was a great surprise to learn, early in 1946, that there had been found living in the province of Szechuan, China, a tree which was wholly strange to botanists and foresters. It had escaped the attention of Armand David, the French missionary who collected plants in central China in 1870; it was not seen by Augustine Henry, who sent many specimens to England during the eighties; E. H. Wilson makes no mention of it, in accounts of his four productive journeys during the first decade of this century. The tree found by forester Wang at Mo-tao-chi, in eastern Szechuan, is a giant visible for miles around and well known to all the villagers as a local wonder. Surely no botanist had ever before climbed the rugged mountain trails leading to the remote valleys where *Metasequoia glyptostroboides* is making its last stand.

A Living Fossil

Even more remarkable than its size is the relationship of this tree to trees in other parts of the world. For it is a Redwood, clearly related to the coast Redwood (*Sequoia sempervirens*) of California, though with differences which will be mentioned later. Still more

amazing is the time relationship of China's newly found Redwood; it is a member of a race which was thought to have disappeared from the face of the earth millions of years ago: a genus previously known only from fossil specimens.

Discovery

Some of the details of the discovery of *Metasequoia* are of interest. We may even start farther back with the discovery of *Sequoia*, for the fossil records of *Sequoia* and *Metasequoia* have long been confused. It was in 1769 that members of the Portola Expedition, traveling over-

Metasequoia tree on a valley slope at Shui-hsa-pa in central China

Author photo





Metasequoia trees in the Valley of the Tiger

land near what is now Watsonville, California, came upon a group of enormous trees, so large that, in the words of the chronicler, Fages, "eight men placed side by side with extended arms are unable to embrace them." There is no record that specimens of these coast Redwoods were collected until 1791, when Thaddeus Haenke of the Malaspina Expedition visited the California coast near Monterey. A year later the Vancouver Expedition brought Archibald Menzies to this region; the specimens he collected were confused by Lambert with the Swamp Cypress, and he described them in 1824 as *Taxodium sempervirens*. It was not until 1847 that Endlicher recognized the distinctive characteristics of the coast Redwood and founded the genus *Sequoia*. In the meantime, fossil cones and leafy shoots of a similar tree had been found in Europe.¹ From that time down to the present, fossil Redwoods have been found over much of the Northern Hemisphere, including many localities in the Arctic Zone. (The dramatic occurrence of these fossils in areas now too cold or too dry to support forests of any sort, has presented to paleobotanists and geologists many puzzling questions regarding the earth and its inhabitants in past ages.)

It remained for the Japanese paleobotanist, Miki, to find a distinguishing characteristic of sufficient importance to justify the founding of a new genus, *Metasequoia* (the Greek prefix "meta" indicates its changed or intermediate characteristics as compared with "Sequoia").² Miki's paper, published in the

¹ These were first assigned to the fossil genus *Taxites* (*Taxites Langsdorffii*) by Brongniart; but their true relationships were recognized by the Swiss paleobotanist Heer in 1855.

² Among the fossil specimens collected in North America and studied by our pioneer paleobotanist, Lesquereux, there was a cone attached to a naked stalk, to which he applied the name *Sequoia Hecrui*. Other cones like it have been found widely over western North America and elsewhere; and paleobotanists have distinguished them from the known species of *Sequoia*, both fossil and



C. T. Hwa and the author beside the Discovery Tree at Mo-tao-chi

Japanese Journal of Botany in 1941, had probably not been seen by any paleobotanist outside of Asia when there came a second announcement: the discovery that there were *living* trees of *Metasequoia* in central China. They had been seen by Tsang Wang, a forester employed by the Ministry of Agriculture, when a journey took him through the vil-

living, without fully understanding their taxonomic status. Miki determined the relationships of these long-stemmed cones; he found them always associated with leafy shoots on which the needles were attached in opposite position; since the scales of the cones were also oppositely arranged, he concluded that they belonged to the same plant. We now know that the arrangement of cone scales, needles, and leafy shoots is decussate [i.e., opposite, with successive pairs crossing each other at right angles]. By contrast, needles on the shoots of *Sequoia*, and the scales of its cones, are arranged spirally. This was the characteristic on which Miki founded the new genus, *Metasequoia*.

lage of Mo-tao-chi in 1944. The three trees growing just east of the village were locally given the name "Shui-hsa," which is the Chinese name for the "Water-pine" (*Glyptostrobus pensilis*), a tree living in south China. One of the trees was much larger than any known "Water-pine"; and there were other differences which interested Wang. The specimens which he took back with him to Nanking proved to be unlike any previously seen by the foresters and botanists in that great center of science in China; they were unknown even to Professor Wan-Chun-Cheng of National Central University, an outstanding authority on the forests of central China. Dr. Hsen-Hsu-Hu, Director of the Fan Memorial Institute of Biology in Peking, was called into consultation. Fortunately he had read Miki's paper describing two fossil species of *Metasequoia*, and he at once recognized

that the cones and leaves of the tree from Mo-tao-chi were identical with those Miki described. Only three years after their first record as fossils, living trees had been found in the interior of China.³

Further Exploration

Through the efforts of Dr. E. D. Merrill, a grant was made from the Arnold Arboretum's restricted Chinese exploration fund, which financed a trip by Cheng's assistant, C. T. Hwa, to Mo-tao-chi and several adjacent localities, in 1947. Working farther south into Hupeh Province, Hwa found several hundred trees of *Metasequoia* in valleys of the Shui-hsa-pa district of Hupeh, and brought back excellent specimens, including a good supply of viable seeds. Some of these were immediately sent to Dr. Merrill, and later to me. They have been planted, and are growing well in Boston,

Chips—all that remain of one of the largest *Metasequoia* trees at Shui-hsa-pa



³ In a letter dated May 9, 1946, Dr. Hu, an old friend and co-worker, wrote me of this remarkable discovery, and of the brilliant conclusion which he and Professor Cheng had reached. Within a week came a second letter with information that "the staminate flowers of the living *Metasequoia* are loosely spiked, a characteristic somewhat similar to the paniced male flowers of *Taxodium*." Reference to our fossil collections from Elko, Nevada, showed, in addition to stalked cones and opposite-needled shoots, several spikes of staminate flowers. These had previously been referred to *Taxodium*, but their opposite position on the spike told us that they were male flowers of *Metasequoia*, associated with ovulate cones and leafy shoots which were generically identical with the fossils from Japan, and with the living trees of Mo-tao-chi. Here were the Redwoods of Asia in the fossil record of North America.

As months passed, additional information came from Dr. Hu, including a short paper in which he recognized the occurrence of fossil *Metasequoia* in coal deposits of Manchuria. There was also a manuscript, which has recently been published, in which he and Cheng described the living trees from central China under the name *Metasequoia glyptostroboides*. He was also in correspondence with Dr. E. D. Merrill of the Arnold Arboretum of Harvard University, to whom specimens were sent in the latter part of 1946, as described in Merrill's paper in *Arnoldia*, March 5, 1948.

in Berkeley, at the botanic gardens in Brooklyn and Bronx Park, New York, and at other stations to which they have been sent by Dr. Merrill. *Metasequoia* is becoming established once more in North America, after a period of absence of some fifteen million years.

Accounts of my trip to central China last February, with a visit to the Redwoods at Mo-tao-chi and Shui-hsa-pa, will be published elsewhere. Data were collected which tell us much of the nature of the forest in which *Metasequoia glyptostroboides* has survived, and answer many questions regarding environmental requirements of the tree. The photographs here included were taken during this brief trip. Dr. Cheng is now carrying on extensive field work with several Chinese associates, and we shall soon know more about the ecology, distribution, and relationships of the Redwoods of China. My current studies in the United States, using funds provided by a grant from the American Philosophical Society, are establishing the fact that



Metasequoia seedling grown at the Brooklyn Botanic Garden

many, perhaps most, of the fossil specimens from North America which have been assigned to *Sequoia* are actually referable to *Metasequoia*. China's Redwoods have had a long and significant history, spanning a hundred million years and covering most of the Northern Hemisphere.



FURTHER NOTES ON METASEQUOIA

Only about 1,000 living specimens of *Metasequoia* have been found, and they are being cut by the peasants for interior finishing. Hence there is great danger of their total extinction. A committee has been established, in the Chinese Government, for the conservation of *Metasequoia*, and the establishment of a *Metasequoia* National Park where the trees were first discovered.¹

¹ H. H. Hu, in "How *Metasequoia*, the 'living fossil,' was discovered in China," in *Journal of the New York Botanical Garden*, September, 1948.

On the basis of microscopic study of cells in the act of dividing, it appears that *Metasequoia* is even more closely related to the California coast Redwood (*Sequoia sempervirens*) than is the Giant Sequoia, or Bigtree (*Sequoiadendron giganteum*). It is believed that the coast Redwood is a hybrid, with an ancient *Metasequoia* as one of its parents.²

² G. L. Stebbins, Jr., in "The chromosomes and relationships of *Metasequoia* and *Sequoia*," in *Science*, July 30, 1948.

HOW TO GROW DOGWOOD FROM SEED

*Report of experiments revealing
one cause of delay*

Richard H. Goodwin

IN temperate climates, where cold winter weather causes all plants except the hardy evergreens to drop their leaves and to become dormant until early spring, our native plants have various devices to meet these rigorous conditions. Since many kinds of plants mature their seeds during the summer and fall, it is important that germination be delayed at least until the next growing season. Sprouting in the fall would result in the death of the tender young seedlings with the first killing frost.

Causes of Delay in Other Plants

Some of the methods used to induce the germination of various types of seeds were described by Dr. Lela V. Barton of the Boyce Thompson Institute for Plant Research, in *PLANTS & GARDENS*, Autumn, 1945. These methods reproduce conditions essentially similar to those encountered in nature. Certain plants, such as Morning-glory and Sweet Clover, have a water-tight seed coat which must be either broken or rotted away before water can reach the little embryo [young plant] within. Many others have a dormancy period during which the embryo fails to grow, regardless of the supply of water. This dormancy may frequently be broken by placing the seeds in a moist

Dogwood in flower

Elsie M. Kittredge photo

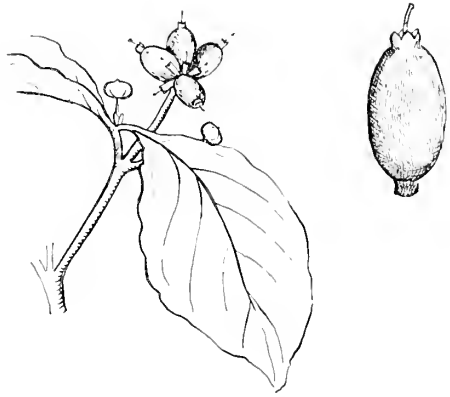


medium (such as peat-moss) at a low temperature (33° to 50° F.) for several weeks or months before planting them in soil. Such treatment is called "stratification," and is effective for seeds of Apple, Rose, Dogwood, and many others.

Although much practical information is available concerning the treatments necessary to obtain good germination, the real nature of dormancy in seeds is still poorly understood. Light has been shed on this problem, however, by recent studies which have demonstrated the presence of chemical substances inhibiting seed germination. These inhibitors have been reported as occurring in fruits of Mountain-ash, Tomato, and White Mustard, in seed coats of Cabbage and Beet, and in the stored food material (endosperm) of Iris seeds. The seeds of these plants will not germinate until the inhibitors have been removed or destroyed. In nature the inhibitors are destroyed during the decay of the fruit or of the seed coat; but germination of the embryo may be hastened by mechanical removal of the structures containing the inhibitors.

Experiments with Dogwood Seeds

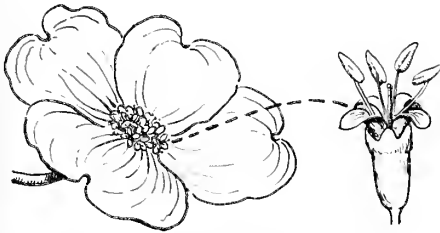
An important part of the program at the Connecticut Arboretum is the propagation of native trees and shrubs for use in civic planting projects. One of the most popular of these plants is the Flowering Dogwood (*Cornus florida*), the seeds of which require a prolonged cold treatment before germination.



Cluster of Dogwood fruits; single fruit enlarged at right

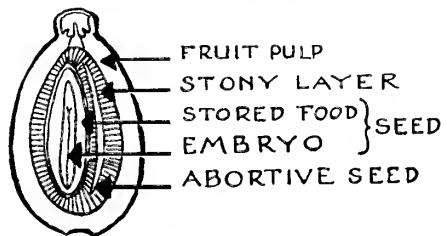
Two years ago, a great many Dogwood fruits were collected, and various seed treatments were employed in an attempt to establish the most satisfactory method of propagating this tree. The following experiments demonstrate the inhibiting effect of the pulp of the Dogwood fruit upon seed germination.

Fruits and depulped seeds were packed in moist Sphagnum moss in glass jars, and stored in a refrigerator (about 38° F.) from September 21 to February 10. By the first of February the depulped seeds had started to germinate in the refrigerator; whereas none of the seeds within the pulp showed any signs of germinating, even after several weeks more in cold storage. Excellent germination was obtained from cold-treated fruits when the pulp was removed and the seeds planted. The pulp was soft and easily



Dogwood "flower," with cluster of true flowers in center; single flower enlarged at right

Section through Dogwood fruit





W. C. Peck photo

Dogwood seedlings germinated in April from seeds planted the previous fall

removed, the seeds (still in a dormant condition) could be handled without damage, and germination was prompt.

In another test, seeds were planted in a flat immediately after collection, some with and some without the red pulpy covering. The flat was then placed out of doors and kept moist throughout the winter. In early April the flat was brought into the greenhouse. A high percentage of the depulped seeds germinated within the first two or three weeks after this. But germination of the seeds left within the intact fruits was delayed for at least a month, and was sporadic.

Dogwood seeds
in
moist Sphagnum



W. C. Peck photo

The accompanying photograph shows the flat as it appeared in mid-June. The seedlings in the rear left-hand corner were from depulped seeds; the remainder, from fruits planted intact.

In growing Dogwood from seed, good germination may be obtained after cold treatment either outdoors or in the refrigerator. A better crop will result if the seeds are depulped before being planted—a procedure which removes a natural source of an unknown chemical that delays germination.

Dogwood fruits

McFarland photo



HOW TO FORCE BRANCHES IN THE HOUSE

For a breath of spring in winter

Will McClelland

FLOWERING branches can be forced in the room temperature of the average home. Easily handled materials are Forsythia, Flowering Quince, and other very early-flowering shrubs. From the experience of forced-branch exhibits in Saginaw, Michigan, and for the benefit of other exhibitors, we make the following suggestions.

Time

The date of the exhibit should be announced about the first week in February, as it will take three to four weeks to force those branches whose flowers or foliage come out most slowly.

Foliage

It should be kept in mind that some foliage subjects are very attractive. Canoe or Paper Birch makes an exhibit so beautiful that it will never be forgotten. American Larch, or Tamarack, is also very interesting, with its hair-like foliage. Ohio Buckeye (*Acsculus glabra*), Red-osier Dogwood, Japanese Barberry, and Red Maple (*Acer rubrum*), are all good foliage material.

Flowers

In selecting flowering branches, see that they have plenty of flower buds and a pleasing outline. Usually the plumper buds are the flowering ones, and the more pointed ones the leaf buds.

Larger branches force fully as well as smaller ones. One of the finest exhibits we have ever seen was of Pear branches which the orchardist had pruned in late fall or early winter and left under the trees; these branches were gathered in

late February. Double-flowering Cherry, cut in December and left where it fell until taken in on February 15, brought good results.

Forsythia is a fine subject, and is very likely used for forcing more than any other shrub. Its blossoms last six to seven days. Cornelian-cherry will come into bloom a day or so sooner than Forsythia, and will remain in bloom a week or more.

Japanese Quince, normally red, will come out an exquisite shade of pink, while the pink Quince will come out white; both kinds of flowers last about five days.

The Saucer Magnolia is easily forced. Redbud is very attractive and the blossoms are long-lasting. Almost all of the fruit trees force easily, as well as Wild Cherry and Wild Thornapple.

The button-flowered Spirea comes out fairly well. Included in the list of those difficult to force are Lilac (*Syringa*),

Japanese Quince (*Chaenomeles japonica*), a favorite for forcing



Deutzia, Mock-orange (*Philadelphus*),
Spiraea Vanhouttei, *Viburnum Carlesii*,
 and Beauty-bush (*Kolkwitzia*).

Method

The method of forcing branches is simple. It is good practice to give them a soaking for a few hours or overnight in lukewarm water. The bathtub answers well for this purpose. Then place them in tall containers in a bright sunny room. The water can be kept sweet by the addition of a little charcoal, but should be changed about once a week, anyway. The best temperatures are about 72° F. in the daytime, and about 68° F. at night; and a humid atmosphere is a great help. If you are forcing for a certain date it will be necessary to keep close watch of the branches. A cooler room temperature (about 40° F.) will hold progress back, while warm water in the container will advance it somewhat. Exhibitors have a tendency to reach the exhibit date with blossoms too far advanced. The

safest and surest way to meet a deadline is to have two sets of branches started about three days apart. Usually, after the buds show color at their tips it will be five or six days before the flowers are in their best bloom. An exception to this is Redbud, which is more likely to take ten days from showing of color in the bud.

Caution

Do not expect to have all the branches come out perfectly every time. For different reasons, such as variable room temperature, lack of good flower buds, and lack of moisture, there will be some failures. Forcing branches is more or less a gamble, but this is only another reason why it is worth trying. Having succeeded with the material suggested, the opportunities for experimenting with additional subjects are limitless.

Below is a chart showing the approximate time required to force flowering and foliage branches to peak condition.

Material for Bloom

Subject	Time
Cornelian-cherry (<i>Cornus mas</i>)	6 to 7 days
Goat Willow or European Pussy Willow (<i>Salix Caprea</i>)	6 to 7 days
<i>Forsythia intermedia</i> var. <i>spectabilis</i>	8 to 9 days
Wild Cherry	11 days
Wild Plum (<i>Prunus americana</i>)	14 days
Manchu or Nanking Cherry (<i>Prunus tomentosa</i>)	14 days
Saucer Magnolia (<i>Magnolia Soulangiana</i>)	14 days
Golden Currant (<i>Ribes aureum</i>)	16 to 18 days
Purple-leaved Cherry Plum (<i>Prunus cerasifera</i> var. <i>atropurpurea</i> , or var. <i>Pissardii</i>)	18 days
Japanese Quince (<i>Chaenomeles lagenaria</i> , or <i>Cydouia japonica</i>)	18 days
Crab Apples in variety	19 to 25 days
Cherry	20 to 21 days
Redbud (<i>Cercis canadensis</i>)	21 to 24 days
Apple, Peach, Pear	24 days
Wild Thornapple (<i>Crataegus</i>)	24 days
Bridal Wreath, or Double-button Spiraea (<i>Spiraea prunifolia</i>)	24 days

Material for Foliage

American Larch, or Tamarack (<i>Larix laricina</i>)	24 days
Canoe or Paper Birch (<i>Betula papyrifera</i>)	24 days
Horse-chestnut (<i>Aesculus Hippocastanum</i>)	24 days
Japanese Barberry (<i>Berberis Thunbergii</i>)	24 days
Red-osier Dogwood (<i>Cornus stolonifera</i>)	24 days

Worth Reading

A SELECTED LIST OF RECENT NON-TECHNICAL BOOKS, MAGAZINE ARTICLES, AND
EXPERIMENT STATION BULLETINS FROM ALL SECTIONS OF THE COUNTRY

General



BREAKING NEW GROUND, by the late Gifford Pinchot. Published by Harcourt, Brace, and Co., New York, 1947. 539 pages. \$5.

History of the beginning and development of the conservation movement in America, by one of the two originators of it.

NATURALISTS OF THE FRONTIER, 2nd ed., by Samuel Wood Geiser. Published by University Press in Dallas, Texas, 1948. 296 pages. \$5.

Primarily about the adventures of eleven men and their struggle for science and culture under frontier conditions. Of interest to layman, historian, and scientist.

DOUGLAS OF THE FIR, by Athelstan George Harvey. Published by Harvard University Press, Cambridge, Mass., 1947. 295 pages. \$4.

Biography of a great plant explorer.

REMINISCENCES OF A CINCHONA HUNTER, by Walter Henriks Hodge. In *Natural History*, Jan., 1948. 8 pages.

Adventures in the Andes in search of emergency sources of quinine.

CLOUD GARDENS IN THE TETONS, by Frank and John Craighead. In *The National Geographic Magazine*, June, 1948. 20 pages.

Adventures in collecting alpine wild flowers in Wyoming.

FAIRCHILD TROPICAL GARDEN, by Lucita H. Wait. Published by The Ronald Press Co., New York, 1948. 391 pages. \$3.

History of the first ten years of a botanic garden in Florida.

MY BEST PLANT INTRODUCTION, by F. Kingdon-Ward. In *The Gardeners' Chronicle* (London), Jan. 3, 10, and 17, 1948. 3 pages.

Evaluation of some of the plants collected over a period of thirty years.

PATENT PLANTS ENRICH OUR WORLD, by Orville H. Kneen. In *The National Geographic Magazine*, March, 1948. 22 pages.

About the Plant Patent Act, with pictures of some interesting patented plants.

GROWING PLANTS WITHOUT SOIL, by Neil W. Stuart. In *The Scientific Monthly*, April, 1948. 9 pages.

History, and modern methods and experiments.

TREES AND TOADSTOOLS, by M. C. Rayner. Published by Rodale Press, Emmaus, Pa., 1947. 97 pages. \$2.50.

A popular presentation of the "partnership" between trees and soil fungi.

OUTDOOR EDUCATION IN PARKS, by Roberts Mann. In *Parks & Recreation*, Jan., 1948. 5 pages.

Day camps, trailside museums, nature centers.

PLANTS: A GUIDE TO PLANT HOBBIES, by Herbert S. Zim. Published by Harcourt, Brace, and Co., New York, 1947. 398 pages. \$3.50.

For amateurs—to help them translate their interest in plants into activity.

THE STORY OF PLANTS, by John Asch. Published by G. P. Putnam's Sons, New York, 1948. 416 pages. \$5.

For the layman: the life of plants, and man's selection and cultivation of them. Many drawings.

THE GEOGRAPHY OF THE FLOWERING PLANTS, by Ronald Good. Published by Longmans, Green, and Co., New York, 1948. 403 pages. \$7.50.

A review of the known facts about plant distribution, and a study of the influence of climate, soil, and methods of dispersal. Maps, photographs, and drawings.

FARMERS OF FORTY CENTURIES, OR PERMANENT AGRICULTURE IN CHINA, KOREA, AND JAPAN, by F. H. King. Published by Rodale Press, Emmaus, Pa., 1948. 379 pages. \$5. First published by Mrs. King, Madison, Wisconsin, 1911.

How these old races worked with nature to preserve the fertility of their soil.

Gardening and Landscaping



LEARNING TO GARDEN, by Olive Mason Gunnison. Published by Funk & Wagnalls Co., New York, 1948. 398 pages. \$2.85.

A practical primer, telling what, when, how, and why. Ornamentals and vegetables.

IN YOUR FLOWER GARDEN, by Stanley B. Whitehead. Published by J. M. Dent and Sons, Ltd., Toronto, Canada, 1947. 125 pages. \$1.25.

Especially good for beginners: planning, and all phases of gardening; how and why; drawings and photographs.

FLOWERS IN COLOUR, by J. F. Ch. Dix and Walter Roozen. Published by Oxford University Press, New York, 1948. 163 pages. \$10.

Natural-color photographs of 120 garden flowers, with brief descriptions and notes on uses.

COMMONSENSE ROCK GARDENING, by F. Kingdon-Ward. Published by Jonathan Cape, London, 1948. 174 pages. \$2.25.

For the amateur: how to choose the right plants and create the right conditions for them.

HAVE YOU AN AIR DRAINAGE PROBLEM? by Montague Free. In *The Home Garden*, Oct., 1947. 3 pages.

Causes and remedies. Diagrams.



GARDEN SOILS: THEIR USE AND CONSERVATION, by Arthur B. Beaumont. Published by Orange Judd Publishing Co., New York, 1948. 280 pages. \$3.50.

On composts, fertilizers, and tillage; written especially for home gardeners.

CONFLICTING DOCTRINES ABOUT SOILS, by Charles E. Kellogg. In *The Scientific Monthly*, June, 1948. 12½ pages.

Explanations and evaluations.

HOW TO WINTERIZE YOUR GARDEN, by Joseph E. Howland. In *Better Homes & Gardens*, Nov., 1947.

Told by illustrations and captions.

THE SOUTHERN GARDEN BOOK, by Louise and Donald Hastings. Published by Doubleday & Co., Inc., Garden City, N. Y., 1948. 282 pages. \$4.95.

Comprehensive but non-technical; for a special section of the country.

ORNAMENTALS FOR SOUTHWEST TEXAS, by E. Mortensen. Texas Agricultural Experiment Station Bulletin No. 695, Oct., 1947. 64 pages.

Pictures, culture notes, and brief descriptions.

GOLDFISH VARIETIES AND WATER GARDENS, by William T. Innes. Published by Innes Publishing Co., Philadelphia, Pa., 1947. 381 pages. \$5.

Water plants for indoors and out; drawings and photographs, some in color.

SUCCESS WITHOUT SOIL, by Charles C. Gilbert. Published by The Chapman-Gilbert Co., Inc., 830 West Ivy St., San Diego 1, Calif. 16 pages. Free on request.

A practical guide for the amateur.

NEW DESIGNS OF SMALL PROPERTIES, by M. E. Bottomley. Published by The Macmillan Co., New York, 1948. 178 pages. \$3.75.

On landscaping the city or country home; practical and easily read. Drawings.

Soil

CHEMICALS, HUMUS, AND THE SOIL, by Donald P. Hopkins. Published by Chemical Publishing Co., Inc., Brooklyn, N. Y., 1948. 365 pages. \$8.50.

A simple presentation of contemporary knowledge and opinions about fertilizers, manures, and soil fertility.

THE EARTH'S GREEN CARPET, by Louise E. Howard. Published by Rodale Press, Emmaus, Pa., 1947. 258 pages. \$3.

For the layman; promoting the organic-gardening idea.

THE COMPOST STORY, by Montague Free. In *The Home Garden*, April, May, June, 1948. 12 pages.

What compost is and how to make and use it.

House Plants and Flower Arrangement



HOUSE PLANTS, by William Godfrey. Dominion of Canada Department of Agriculture (Ottawa) Farmers' Bulletin 145, Nov., 1947. 85 pages.

Choice, propagation, pest control, general care. Pictures.

HOW TO BE SUCCESSFUL WITH HOUSE PLANTS, by Fleeta Brownell Woodroffe. In *Better Homes & Gardens*, Dec., 1947.

General rules, and individual care.

THE CAMELLIA, ITS CULTURE AND NOMENCLATURE, by William E. Woodroof, Vern O. McCaskill, and O. L. Eakin. Published by The Southern California Camellia Society, Pasadena, Calif., 1947. 69 pages. \$1.

A pioneer in its field; includes brief descriptions.

SOME MOREAS, by Sarah V. Coombs. In *The National Horticultural Magazine*, April, 1948. 11 pages.

Descriptions of seventeen kinds, and pictures of three, of these "Irises of the southern hemisphere."

TUBEROUS BEGONIAS, by Worth Brown. Published by M. Barrows and Co., New York, 1948. 128 pages. \$2.75.

By one who has grown and hybridized Begonias; history, classification, culture. Drawings.

THE AFRICAN VIOLET, by Helen Van Pelt Wilson. Published by M. Barrows and Co., New York, 1948. 191 pages. \$2.50.

The first book on "America's favorite house plant." Drawings.

A B C OF ORCHID GROWING, by John V. Watkins. Published by Ziff-Davis Publishing Co., Chicago, Ill., 1948. 143 pages. \$3.

For the amateur; authoritative; based on practical experience. Photographs.

FLOWER ARRANGEMENT, A HOBBY FOR ALL, by Matilda Rogers. Published by The Woman's Press, New York, 1948. 72 pages. \$1.50.

Simple, practical directions. Photographs and drawings.

Plant Breeding

BACKYARD BURBANKS, by Arthur Hawthorne Carhart. In *Nature Magazine*, March, 1948. 3 pages.

About the breeding of Irises by Charles and Agnes Whiting—the latter a recipient of the American Iris Society medal for hybridizing.

BREEDING THE ORIENTAL POPPY, by A. E. Curtis. In *Bulletin of the Garden Club of America*, Sept., 1948. 5 pages.

The author's own experiences.

Weed Control



CHEMICAL CONTROL OF WEEDS IN SOUTH DAKOTA, by Lyle A. Derschheid and L. M. Stahler. South Dakota State College (Brookings) Agricultural Experiment Station Circular 69, Feb., 1948. 14 pages.

Recommendations based on experiments on eight kinds of weeds and six killers.

LAWNS WITHOUT CRAB GRASS, by J. A. DeFrance. In *Flower Grower*, July, 1948. 1 page.

A new selective chemical killer.

TURF WEED CONTROL WITH 2,4-D, by Fanny-Fern Davis. Published by Hobart Publishing Co., Washington, D. C., 1948. 87 pages. \$3.25.

Based on three years' research and experience, to guide homeowners and others.

SIMPLIFYING 2,4-D, by George Knowles. Dominion of Canada Department of Agriculture (Ottawa) Circular No. 178, June, 1948. 8 pages.

When and how to apply it, and how to calculate the dosage of the various brands.

2,4-D EFFECTS IN CONNECTICUT VEGETATION, 1947, by Frank E. Egler. In *Ecology*, July, 1948. 4 pages.

Report on experiments with sixty-three kinds of weeds, not including lawn weeds.

Diseases and Pests



COMMON DISEASES OF IMPORTANT SHADE TREES, by Rush P. Marshall and Alma M. Waterman. United States Department of Agriculture (Washington, D. C.) Farmers' Bulletin No. 1987, March, 1948. 54 pages.

Descriptions, pictures, control.

ROSE DISEASES AND THEIR CONTROL, by Neil Allan MacLean and Roderick Sprague. State College of Washington (Pullman) Agricultural Experiment Stations Popular Bulletin 185, Nov., 1947. 12 pages.

The four commonest in Washington, and several others.

THE BIG THREE OF GARDEN DISEASES, by Cynthia Westcott. In *The Home Garden*, June, 1948. 6 pages.

Mildews, rusts, leaf spots—and what to do about them.

TOMATO FOLIAGE DISEASES AND THEIR CONTROL, by C. F. Bishop. West Virginia University (Morgantown) Agricultural Extension Service Circular 350, Feb., 1948. 8 pages.

Pocket-size pamphlet.

SPRAYING HOME FRUIT PLANTINGS, by H. G. Swartwout, W. R. Martin, Jr., and Lee Jenkins. University of Missouri (Columbia) Agricultural Experiment Station Circular 326, April, 1948.

Materials and methods, for insects and for diseases.

HANDBOOK ON INSECT ENEMIES OF FLOWERS AND SHRUBS, by C. A. Weigel and L. G. Baumhofer. United States Department of Agriculture (Washington, D. C.) Miscellaneous Publication No. 626, Jan., 1948. 119 pages. 35 cents.

Recognition and remedies.

INSECT PESTS OF LAWNS, by E. G. Kelsheimer. University of Florida (Gainesville) Agricultural Experiment Station Press Bulletin 642, Feb., 1948. 4 pages.

Recognition and control.

CONTROL OF THE JAPANESE BEETLE, by John C. Schread. Connecticut Agricultural Experiment Station (New Haven) Circular 166, May, 1948. 8 pages.

Life history of the beetle, and use of chemicals and diseases against it.

CONTROL OF MOLES, by A. N. Tissot. University of Florida (Gainesville) Agricultural Experiment Station Press Bulletin 643, March, 1948. 4 pages.

Description, habits, traps.

ROOT KNOT IN ARIZONA, by J. G. Brown. University of Arizona (Tucson) Agricultural Experiment Station Bulletin 212, Feb., 1948. 40 pages.

Description and pictures of the knot and the parasite, and control measures.

THE G-MEN OF THE GARDEN, by Elberta Wagner Fleming. In *The American Home*, August, 1948.

Beneficial insects, with pictures by Edwin Way Teale.

Annuals, Perennials, Bulbs



ANNUAL FLOWERS, by John V. Watkins. University of Florida (Gainesville) Agricultural Extension Bulletin 133, Oct., 1947. 50 pages.

Selection, culture, descriptions, pictures.

COLOR BREAKING IN PANSIES AND VIOLAS, by Henry H. P. Severin. University of California (Berkeley) Agricultural Experiment Station Circular 377, Feb., 1948. 4 pages.

Symptoms and prevention.

PANSIES HAVE APPEAL, by Esther T. Latting. In *The American Home*, June, 1948.

How to grow them from seed and care for them.

HIGHLIGHTS AMONG THE GERANIUMS, by C. W. Wood. In *American Nurseryman*, Sept. 15, 1948. 2 pages.

Hardy ones for the garden: cranesbills, not the house Pelargoniums.

HERBS AND HOW TO KNOW THEM, by Mary Thorne Quelch. Published by Faber and Faber, Ltd., London, 1946. 280 pages. \$1.75.

Descriptions, and uses in cooking and in medicine.

THE CULTIVATED SPECIES OF PRIMULA, by Walter C. Blasdale. Published by University of California Press, Berkeley, Calif., 1948. 295 pages. \$7.50.

For the layman as well as the scientist; based on twenty years' experience. Drawings and photographs.

THE CHRISTMAS ROSE, by Arthur E. and Mildred V. Lucy. Published by Arthur E. Lucy, Bedford, Ohio, 1948. 44 pages. \$2.

History, pictures, and culture.

COLUMBINES AND THEIR CULTURE, by C. W. Wood. In *American Nurseryman*, June 1, 1948. 2 pages.

With descriptions of and notes on various kinds.

GOOD FERNS FOR HOME GARDENS, by Robert S. Lemmon. In *The Home Garden*, Aug., 1948. 11 pages.

Pictures and descriptions of sixteen suggested kinds.

BULBS FOR HOME GARDENS, by John C. Wister. Published by Oxford University Press, New York, 1948. 278 pages. \$5.

Primarily for the amateur; history, description, and culture of bulbs—hardy, half-hardy, and tender. Drawings and photographs.

THE LILY YEARBOOK. George L. Slate, editor. Published by The North American Lily Society at Geneva, N. Y., 1948. 125 pages. \$3.

A collection of articles by specialists.

Fruits and Vegetables



PART-TIME FARMING IN NEW ENGLAND, by Orlin J. Scoville and others. University of Connecticut (Storrs) Extension Bulletin 383, Oct., 1947. 30 pages.

Advantages and disadvantages; guide for selection of enterprises.

VEGETABLE GROWING, by James Sheldon Shoemaker. Published by John Wiley & Sons, Inc., New York, 1947. 512 pages. \$4.50.

For amateur and professional. Culture of each vegetable treated separately.

THE HOME VEGETABLE GARDEN, by Leon C. Snyder. University of Minnesota (St. Paul) Extension Bulletin 174, revised Feb., 1948. 36 pages.

Planning, soil, starting early plants, cultivating, mulching, pests, storage.

QUICK FREEZING AND FAMILY FOOD GARDENING, by Gordon Morrison. Published by Stephen Daye Press, New York, 1948. 220 pages. \$2.75.

A practical handbook for beginners and for more experienced gardeners.

PLANNING FOR FRUIT, and PLANTING AND CARE OF FRUIT TREES, IN THE HOME GARDEN, by E. G. Christ and Arthur J. Farley. Rutgers University (New Brunswick, N. J.) Extension Bulletins 247, 248, Jan. and March, 1948.

Soil, sun, space, varieties, ordering, planting, spraying, pruning, dwarfing, pests.

HOME FRUIT GROWING IN CALIFORNIA, by W. L. Howard, revised by Reid M. Brooks. University of California (Berkeley) Agricultural Extension Circular 117, Sept., 1947. 83 pages.

Including nuts; suitable kinds and varieties, descriptions, pictures, culture notes.

PRUNING FRUIT TREES, by Howard A. Rollins and Arthur C. Bobb. University of Connecticut (Storrs) Extension Bulletin 351, reprinted Sept., 1947. 12 pages.

Young, bearing, and old; apple, peach, pear, cherry, plum.

DWARF FRUIT TREES, by Lawrence Southwick. Published by The Macmillan Co., New York, 1948. 130 pages. \$2.50.

Advantages and methods of dwarfing; photographs and drawings.

FRUIT FROM A CITY GARDEN, by Marguerite R. Smith. In *The American Home*, Sept., 1948. 2 pages.

Fruit trees and shrubs, and strawberries, planted among ornamentals.

BUSH FRUITS IN THE HOME GARDEN, by E. G. Christ and F. A. Gilbert. New Jersey Agricultural Experiment Station (New Brunswick) Circular 509, Feb., 1948. 8 pages.

Blackberries, raspberries, dewberries, currants, gooseberries. Illustrations.

BLUEBERRY CAGES, by George O. Clark. *Arnoldia*, July 16, 1948. 4 pages.

For protection against birds and rabbits. Illustrations.

Trees, Shrubs, Vines



LIVING WITH TREES, by the late J. Horace McFarland. In *Flower Grower*, Jan., 1948. 4 pages.

Delightful narrative, illustrated with his own pictures; doubtless one of the last of this author's writings.

PLANTING AND CARE OF SHADE TREES, by J. E. Davis. Illinois Natural History Survey (Urbana) Circular 36, Sept., 1947. 30 pages.

Including kinds and sizes to use. Pictures.

CHRISTMAS TREE FARMING, by J. A. Cope. In *American Forests*, Dec., 1947. 3½ pages.

Profitable and satisfying, if done properly.

CONCERNING HARDINESS, by Robert S. Sturtevant. In *The National Horticultural Magazine*, Jan., 1948. 2 pages.

A request for reports on success or failure with borderline cases.

THE PRUNING BOOK, by Gustav L. Wittrock. Published by Rodale Press, Emmaus, Pa., 1948. 172 pages. \$3.

A clear and simple handbook. Drawings and photographs.

WOODY PLANTS WITH INTERESTING BARK IN WINTER, by Donald Wyman. *Arnoldia*, Nov. 28, 1947. 8 pages.

Classified mainly by color.

FLOWERING SHRUBS AND SMALL TREES, by N. Catchpole. Published by W. H. & L. Collingridge, Ltd., London, England, 1948. 234 pages. \$2.60.

Culture, propagation, pruning.

ORNAMENTAL CHERRIES, by Collingwood Ingram. Published by Country Life, Ltd., London, 1948. Marketed in this country by Charles Scribner's Sons, New York. 259 pages. \$6.

For the gardener and the botanist, by the greatest living authority on the subject.

HOLLIES THAT EVERYONE CAN GROW, by Betty Blossom. In *House and Garden*, Dec., 1947. 3 pages.

Native, English, and Oriental; red- and black-fruited.

MAGNOLIAS IN THE NORTH, by Henry F. Leweling. In *American Nurseryman*, July 15, 1948. 4 pages.

Kinds, culture, pictures.

ROSES FOR EVERY GARDEN, by R. C. Allen. Published by M. Barrows and Co., Inc., New York, 1948. 218 pages. \$3.50.

Non-technical, emphasizing only the practices essential to success. Drawings and color photographs.

ROSE CULTURE, by A. O. Rasmusen. Pennsylvania State College (State College) Agricultural Extension Circular 311, December, 1947. 8 pages.

Soil, trenching, fertilization, planting, pruning, protection, kinds.

AZALEAS: KINDS AND CULTURE, by H. Harold Hume. Published by The Macmillan Co., New York, 1948. 207 pages. \$3.75.

Based on the author's long experience; valuable to amateurs and professionals; with photographs in black-and-white, and in color.

CLIMBERS AND GROUND COVERS, by Alfred Carl Hottes. Published by A. T. De La Mare Co., Inc., New York, 1947. 306 pages. \$3.

Practical and instructive. Drawings and photographs.

Grass and Lawns



GRASS: THE YEARBOOK OF AGRICULTURE, edited by Alfred Steferud. Published by the United States Government Printing Office, Washington, D. C., 1948. 906 pages. \$2.

A Congressional document dealing with conservation, the enemies of grass, lawns, the search for better grass, etc. Charts, tables, maps, photographs, and drawings.

LAWN CULTURE IN MISSOURI, by T. J. Talbert and E. Marion Brown. University of Missouri Agricultural Experiment Station Circular 322, Feb., 1948. 12 pages.

Preparation, sowing, fertilizing, shade, mowing, raking, watering, weed control.

Native Plants



KNOWING YOUR TREES, by G. H. Collingwood and Warren D. Brush. Published by American Forestry Assn., Washington, D. C., 1947. 312 pages. \$5.

General and detail photographs, descriptions, and uses of 150 native trees; distribution maps.

NORTH AMERICAN TREES, by Richard J. Preston, Jr. Published by the Iowa State College Press, Ames, Iowa, 1948. 428 pages. \$4.

A handbook for layman, student, and scientist.

THE FERNS OF NEW JERSEY, by M. A. Chrysler and J. L. Edwards. Published by Rutgers University Press, New Brunswick, N. J., 1947. 208 pages. \$4.

A book for the amateur and the scientist. Photographs and distribution maps.

BEGINNERS' GUIDE TO WILD FLOWERS, by Ethel Hinckley Hausman. Published by G. P. Putnam's Sons, New York, 1948. 384 pages. \$3.50.

Descriptions and drawings of over a thousand wild flowers, arranged by color. Especially useful east of the Mississippi.

WILD FLOWER GUIDE, NORTH-EASTERN AND MIDLAND UNITED STATES, by Edgar T. Wherry. Published by Doubleday & Co., Inc., Garden City, N. Y., 1948. 215 pages. \$3.

Descriptions and drawings of about 500 wild flowers, arranged by families, but also listed according to color. Nearly half of the illustrations are in color.

FLOWERS OF PRAIRIE AND WOODLAND, by Edith S. Clements. Published by The H. W. Wilson Co., New York, 1947. 87 pages. \$1.85.

Descriptions, and illustrations in color, of over 100 flowers.

Conservation



THE EARTH'S FACE AND HUMAN DESTINY, by Ehrenfried Pfeiffer. Published by Rodale Press, Emmaus, Pa., 1947. 182 pages. \$2.75.

For the layman: man's responsibility in shaping his environment. Photographs.

OUR AMERICAN LAND: THE STORY OF ITS ABUSE AND ITS CONSERVATION, by Hugh H. Bennett. United States Department of Agriculture (Washington, D. C.) Miscellaneous Publication No. 596, revised April, 1948. 31 pages.

Land classification, conservation practices, and "the job ahead."

OUR PLUNDERED PLANET, by Fairfield Osborn. Published by Little, Brown, and Co., Boston, Mass., 1948. 228 pages. \$2.50.

Warning to stop destructive practices.

ROAD TO SURVIVAL, by William Vogt. Published by William Sloane Associates, Inc., New York, 1948. 348 pages. \$4.

About man's suicidal "conquest of nature."

OUR GROWING WATER PROBLEM, by Edward N. Munns. In *American Forests*, Aug. and Sept., 1948. 11 pages.

Causes and remedies: first, prevent forest fires!

KNOW YOUR WATERSHEDS. United States Department of Agriculture Forest Service (Washington, D. C.) Agricultural Information Series No. 67, Feb., 1948. 15 pages.

What we can do to assure safe and dependable water supplies.

TREE PLANTING IN THE CENTRAL, PIEDMONT, AND SOUTHERN APPALACHIAN REGIONS, by Leon S. Minckler and Arthur G. Chapman. United States Department of Agriculture (Washington, D. C.) Farmers' Bulletin No. 1994, Feb., 1948. 39 pages.

Where and what kinds to plant, and how to care for them. Pictures and diagrams.

FOREST PLANTATIONS, THEIR ESTABLISHMENT, GROWTH, AND MANAGEMENT, by Daniel Den Uyl. Purdue University (Lafayette, Ind.) Agricultural Experiment Station Circular 331, Feb., 1948. 32 pages.

What kinds to use, and how they grow when planted.

WITHIN THE BROOKLYN BOTANIC GARDEN

FALL ROSE DAY

About 500 persons were present on October 7 at the twenty-first annual Fall Rose Day, which had as its theme: Rose Pests and Diseases. For the second consecutive year the American Rose Society co-sponsored the event.

Among those who spoke, Dr. Cynthia Westcott, the "Plant Doctor" of Glenridge, N. J., outlined measures for the control of plant diseases and pests; and George S. Sweetser, President of the American Rose Society, described the

winning qualities of the top twelve Hybrid Teas that were chosen in a nationwide contest held by the Society.

Two new events were added this year. Demonstrations of the training of ramblers and climbers, and winter care of Roses were given by members of the staff in the Rose Garden. Also, a poll was conducted to determine the favorite Rose; the winner, by a resounding plurality, was Peace.

One of several hundred votes for **Peace** as the best Rose in the Garden





Exhibition Chrysanthemums grown by William Westenfeld of the Garden staff

CHRYSANTHEMUMS

The two collections on the grounds provided visitors with a double opportunity. In one planting, a wide assortment of varieties was arranged for easy comparison so that the amateur gardener could observe them for future use in his own garden. In the Osborne Memorial Section, thousands of plants, of more than 100 varieties, showed an effective and spectacular display with large masses of Chrysanthemums in actual use as a border planting.

Hothouse varieties, exhibited in the greenhouses, ranged from large football types to rare spidery-type Chrysanthemums. Some of the plants shown in the picture grew to heights of 7 or 8 feet, with blossoms as large as a young girl's head. Cascade Chrysanthemums festooned the walls, while spoon, hairy, brush, and large-flowered types filled every inch of floor space.



Rhododendrons flanking the Washington Avenue entrance to the Laboratory Building—part of a larger gift recently received from Mr. and Mrs. John C. Parker and the Woman's Auxiliary.

ORIENTAL GARDEN RE-OPENED

The Oriental Garden, closed since 1941, was opened in May, during Brooklyn Botanic Garden Week. Since then many thousands of visitors have found pleasure in walking through this Garden, which is unique in the eastern United States.

Funds for the extensive repairs needed are not now available; but in spite of the numerous needs, this Garden is a fascinating beauty spot—as it has been since its dedication on May 7, 1915, by Mr. Alfred T. White.



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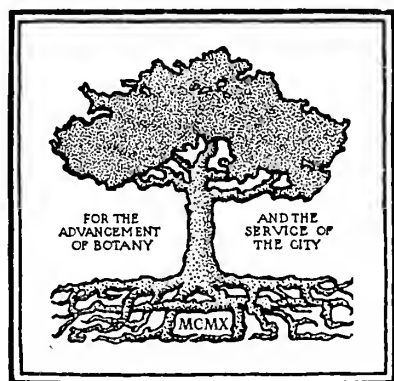
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PLANTS & GARDENS



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